

1948  
TRACTORS • TRAILERS • BODIES • ENGINES • AIRCRAFT



FARM & ROAD MACHINERY • PARTS • ACCESSORIES

EQUIPMENT • FOR PRODUCTION • SERVICE • MAINTENANCE

# AUTOMOTIVE INDUSTRIES

PASSENGER CARS • MOTOR TRUCKS • BUSES

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## IN THIS ISSUE

Latest Innovations at GMC Bus Plants  
Heat Treating Research at Mack  
New French Racer with Twin Four Engine  
British Diesel Trucks Designed for Export  
Highlights of the SAE Summer Meeting  
Testing Operations at Lincoln Plant

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No. 137 BCS**

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# AUTOMOTIVE INDUSTRIES

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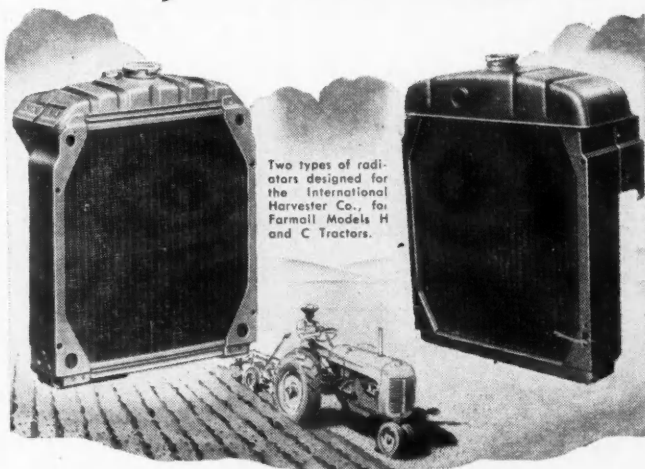
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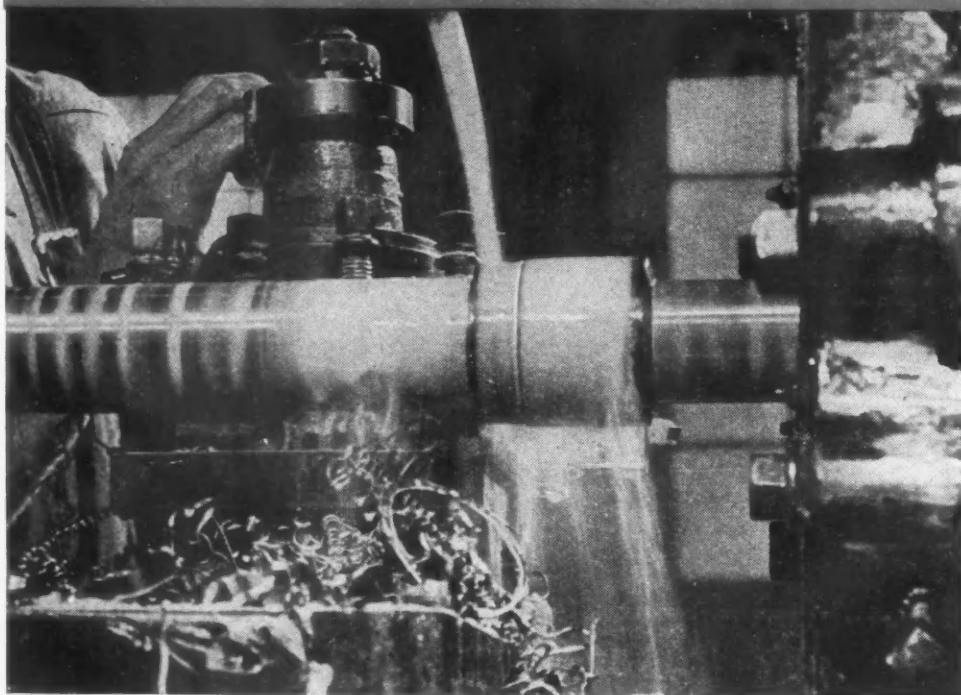
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**AUTOMOTIVE  
INDUSTRIES**  
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## High Spots of This Issue

### Latest Innovations at GMC Bus Plants

Postwar expansion brought about an accelerated tempo in bus production which is amply reflected at GMC bus plants. An impressive use of hoists and elevators for transporting sub-assemblies and completed buses at GMC is one of the modern big-scale improvements described on page 26.

### New Vehicle Design

Engineering innovations indicative of the trend in future bus and military vehicle design are incorporated in Greyhound's new experimental intercity bus and cargo carriers developed by Army Ordnance for tactical use. Major features of these vehicles together with other highlights of the recent SAE summer meeting will be found in the article on page 32.

### Twin-Four Dommartin-Petit Racer

This French racing car designed by Emile Petit appears in competition for the first time this year. It is expected to take part in all leading European races of the present season. Many of its outstanding mechanical features are clearly described and illustrated, starting on page 38.

### The Vital Role of Heat Treating Research

Heat treating in the development and production of vehicles and engines is a determining factor in their performance. How the Mack Mfg. Corp. uses proper temperature control and measurement in the fabrication of their trucks, buses, fire apparatus, and marine engines is detailed on page 42.

### The Comets

An entirely new series of Diesel-engined trucks is being produced essentially for export by Leyland Motors, Ltd., England. Consisting of freight, dump, and tractor models, all have five-speed transmissions and hypoid bevel rear axle. These and other new features of the trucks are presented on page 44.

### 26 New Product Items And Other High Spots, Such As:

An editorial entitled Clear the Road For Free Enterprise, which analyzes the state of our present prosperity and points to pitfalls; a feature article on Indianapolis race cars showing changes in design over previous years; a photo feature viewing assembly and testing innovations at the Lincoln plant; and facts on Britain's first under-the-floor design for Diesel engines now being delivered for bus service in Norway.

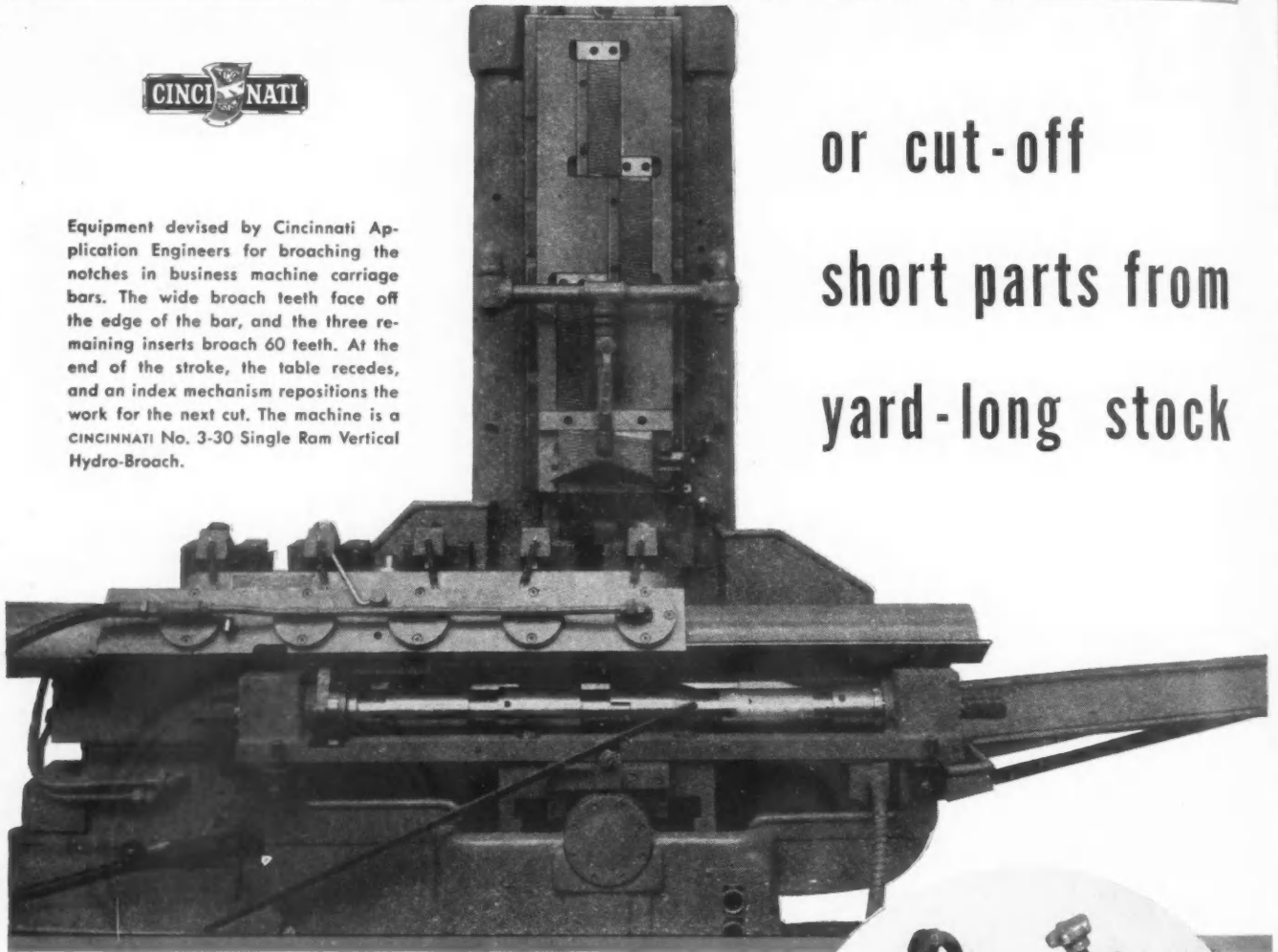
*News of the Automotive Industries, Page 17  
For Complete Table of Contents, See Page 3*



# HOW TO BROACH PARTS BY THE YARD...

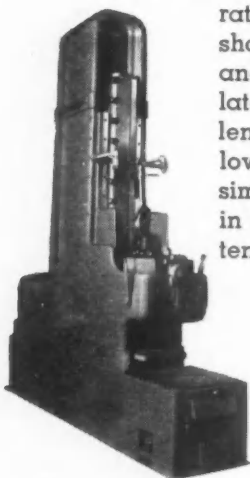


Equipment devised by Cincinnati Application Engineers for broaching the notches in business machine carriage bars. The wide broach teeth face off the edge of the bar, and the three remaining inserts broach 60 teeth. At the end of the stroke, the table recedes, and an index mechanism repositions the work for the next cut. The machine is a CINCINNATI No. 3-30 Single Ram Vertical Hydro-Broach.

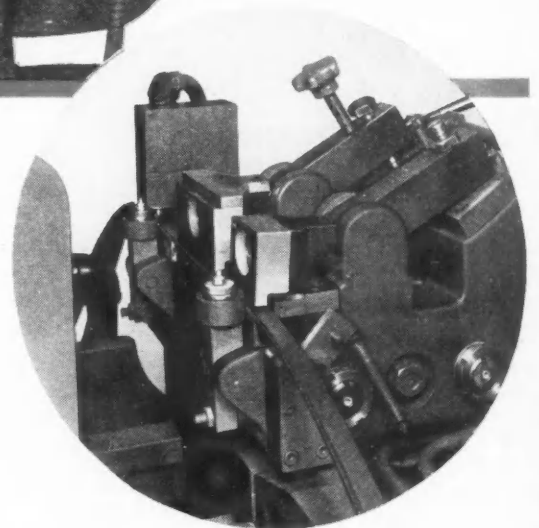


or cut-off  
short parts from  
yard-long stock

How long can a broached surface be? On flexible parts, like band saw blades, it can be up to 700 feet long! Rigid parts, like carriage stop bars, have been up to 30 in. long! These long parts are today being broached on CINCINNATI Hydro-Broach Machines, at production rates never before approached. Examples are shown here. The operating cycle is automatic and follows a basic pattern... broach, index laterally, broach, and repeat for complete length of part. It offers a new and extremely low cost method of machining notches, teeth or similar contours, evenly or irregularly spaced, in long parts. And the method can be extended still further... broaching and cutting off short pieces made from bar stock. Our Application Engineers will help you explore the possibilities. As a starter, send blueprint of part with complete details.



CINCINNATI No. 3-48 Single Ram Vertical Hydro-Broach. Specifications may be obtained by writing for catalog M-1389-2.



Close-up of fixture for broaching the teeth in band saw blades, on a CINCINNATI No. 3-30 Single Ram Vertical. The cycle is automatic, and incorporates a shuttling fixture which repositions the work for each downward stroke of the ram. Taking a cut 6 in. wide, 2500 feet of saw teeth are broached per hour.

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# NEWS *of the* AUTOMOTIVE INDUSTRIES

Vol. 99, No. 1

July 1, 1948

## **Ford Freezes Dealer Profit On 1949 Model**

Rumblings about a slash in the automobile dealer discount structure have been current in trade circles for several months. Ford has been the first company to take definite action in this direction by freezing its dealers' gross dollar profit on the 1949 model Ford at the same level that prevailed on the 1948 model. In effect this means that the dealer discount is not applied to the \$75 to \$125 increases announced when the new car was introduced. Consequently, dollar profits to the dealer will be the same on each different type Ford as it was on the 1948 model. Thus, the entire increase will go to the company, without the additional markup to the public to cover the dealers' discount on the increase. The action applies only to Ford cars and trucks, and Lincolns and Mercurys are not affected. In a letter to dealers, J. R. Davis, Ford sales chief, said that the move is a temporary price structure and that the company's attitude toward the historical dealer discount has not been altered. He said that dealers need have no concern about being placed at a competitive disadvantage when the buyers market returns.

## **Kunkle Elected Member of GM Board**

Bayard D. Kunkle, vice president and group executive in charge of overseas and Canadian operations, has been elected a member of the GM board and of the corporation's operations policy committee. All of the other officers of the corporation were reelected.

## **Crosley Nine Months Net Exceeds Previous Year**

Crosley Motors, Inc. has reported earnings for the first nine months of its current fiscal year of \$807,096, compared with \$476,065 for the entire preceding fiscal year. Sales for the period amounted to \$17,203,000, more than \$5 million ahead of the entire fiscal year ended July 31 last year. The company reports that it has

shipped a total of more than 43,000 cars to date, and that it has operated in the black continuously since December of 1946. Current production is 3000 cars a month, and the backlog of unfilled orders has increased to 8000 units. A current expansion program, when completed, will raise production capacity to 3500 units a month. Crosley is currently making most of its own parts. The dealer organization now totals more than 700 throughout the country, and consists largely of agencies dealing exclusively in Crosley sales and service.

## **K-F One-Shift Output Tops Old Two-Shift Mark**

Late in June, The Kaiser-Frazer Corp. turned out its 250,000th automobile, marking the end of its first two years in the automobile business. Another interesting fact revealed by Edgar F. Kaiser, vice president and general manager, is that the schedule of 21,000 units for June is a new

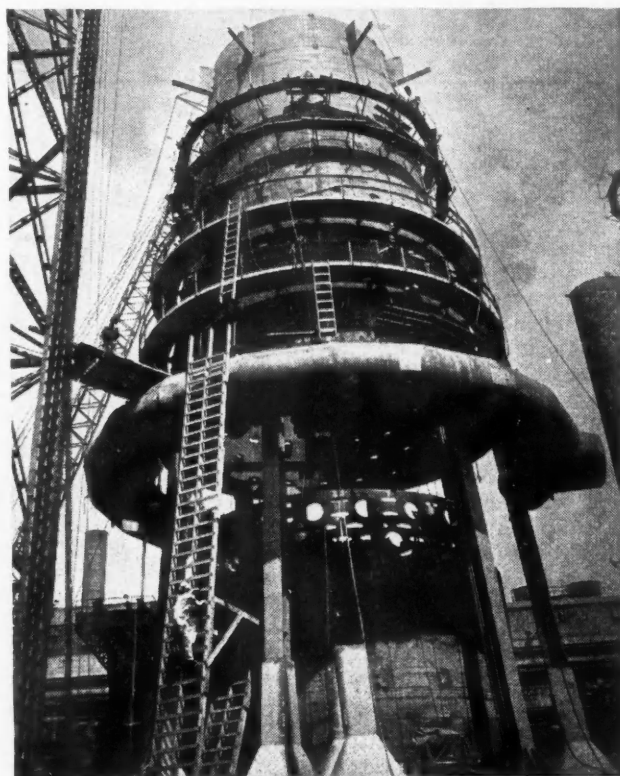
monthly production peak for K-F despite the fact that it is now on a one-shift basis of nine hours a day, except Saturdays when it is on an eight hour basis. The previous high mark was made in January with the production of 20,667 units on a two-shift basis. Production was reduced to one shift in March. Currently, K-F is producing more than 800 units a day.

## **Cadillac to Open Branches In California**

GM's Cadillac Div. is the latest automobile builder to further reduce the number of its distributors. It will establish factory branches in California to replace the Don Lee organization which has been Cadillac's distributor in that area since 1911. Factory branches will be set up in four major cities. Cadillac reports that California market now accounts for 10 to 12 per cent of its national sales.

## **BIG BLAST**

It is expected that this new Ford Motor Co. blast furnace at the Rouge plant will double the company's output of pig iron when it is completed in October. Workmen are shown scaling the sides of the new furnace which is said to be one of the largest in the country.



# NEWS of the AUTOMOTIVE INDUSTRIES

## Ford, GM End Fleet Rebates; Others to Follow

The Ford Motor Co. has followed the lead of GM in abandoning its fleet agreements calling for a three per cent rebate to eligible purchasers. GM announced June 5 that the agreement was out, and then followed it a few days later with a new agreement substantially the same as the old one insofar as fleet services are concerned, but eliminating the three

other companies in the industry having fleet agreements will follow the lead of Ford and GM. Chrysler has never liked the fleet discount system, and will undoubtedly abandon it. Studebaker is also said to be considering similar action and other passenger car companies with fleet agreements are expected to follow suit with the possible exception of Packard and Kaiser-Frazer. It is also believed that recent wage increases were an important if not de-

els toward the end of this year. Reports circulating in Detroit say it may be 1949 before the new Chrysler models appear. Other reports concerning Chevrolet say that original plans for introducing the new model late this year may be revised to push the introduction ahead, possibly to September, but that appears unlikely. Kaiser-Frazer is also planning some revision of its styling, it is understood, but no details are available as to timing. In all cases, information about the new models is a very closely guarded secret. A possible hitch on new model tool and die work developed in Detroit about the middle of June when the UAW-CIO called out 5100 workers in 75 tool and die jobbing shops. The strike was called in a wage dispute which found the Automotive Tool and Die Manufacturers Association and the union nine cents an hour apart. It was hoped, however, that the differences could be compromised shortly. A coal strike this summer or further material shortages caused by ECA and armament programs might also delay new model introduction.

## NEW PASSENGER CAR REGISTRATIONS\*

Arranged by Makes in Descending Order According to the Three Months' 1948 Total.

Make	March 1948	February 1948	March 1947	—Three Months—		Per Cent of Total	
				1948	1947	1948	1947
Chevrolet	62,706	49,729	45,950	164,395	122,579	20.84	19.31
Ford	40,593	39,982	41,903	123,074	111,483	15.60	17.57
Plymouth	27,958	20,303	26,180	76,877	65,134	9.74	10.26
Buick	23,182	18,744	17,938	58,968	48,605	7.47	7.66
Pontiac	22,399	17,110	16,043	54,765	41,759	6.94	6.58
Dodge	17,502	13,604	15,271	50,181	40,376	6.36	6.36
Oldsmobile	17,298	11,832	14,310	40,513	39,505	5.14	6.22
Studebaker	12,541	9,359	7,995	31,273	21,140	3.96	3.33
Mercury	8,113	8,942	9,015	26,688	23,628	3.38	3.72
Nash	10,112	7,887	9,111	26,113	23,665	3.31	3.73
Hudson	10,318	6,497	8,488	23,086	21,439	2.93	3.38
Chrysler	8,525	5,855	7,144	22,416	18,882	2.84	2.98
Kaiser	7,644	6,319	3,047	21,026	7,845	2.67	1.24
DeSoto	6,421	4,296	4,868	17,084	13,475	2.17	2.12
Frazer	4,565	4,441	1,648	14,184	4,094	1.80	.64
Packard	5,468	3,326	3,393	12,686	8,880	1.61	1.40
Cadillac	3,436	1,697	3,547	9,180	10,005	1.16	1.58
Willys-Overland	2,706	1,766	1,533	6,264	4,115	.79	.65
Crosley	1,867	1,331	1,320	4,573	2,996	.58	.47
Lincoln	1,058	1,161	1,897	3,826	4,891	.48	.77
Austin	742	424	.....	1,400	.....	.18	.....
Playboy	1	2	.....	3	.....	.....	.....
All Others	200	73	49	342	166	.05	.03
Total	295,265	234,680	240,650	788,917	634,662	100.00	100.00

\* Data from R. L. Polk & Co. and are complete for all states except California for the first three months and Vermont for March.

per cent rebate on the purchase of 20 or more cars and/or trucks a year. In addition, the new agreement does not cover individually owned cars of employees of fleet agreement holders as did the old contract. The principal advantage of the new agreement is that buyers can concentrate their purchasing through one company, and will undoubtedly be able to get better service on deliveries. Discounts on parts will remain in effect since they were not part of the old fleet agreement. The action applies to all GM passenger cars and Chevrolet trucks. A GM spokesman said that such action had been under consideration for a long time and that the corporation could see no justification for the rebate in the current boom market. A Ford spokesman said that elimination of the fleet agreement was necessary to hold costs at a minimum and to maintain prices at the lowest possible level.

It is practically certain that all

cisive factor in prompting the elimination of the rebate.

## Expect Ford '48 Output to Hit 1.15 Million Units

Ford Motor Co. expects to produce about 1,150,000 vehicles this year, Henry Ford II, president, revealed that Ford had on hand about 1.3 million orders for Fords, and between 200,000 and 300,000 for Lincolns and Mercurys. The breakdown is reported to be 225,000 Mercurys, and 75,000 Lincolns.

## Strikes and Shortages Cloud Timing of New Models

About the only certain information concerning the next automobile company to change models is that Nash will proceed according to plan and come out with its new model in late September or October. Considerable confusion still exists insofar as other companies are concerned. The general belief now is that the Chrysler strike may have delayed the company's plans for introducing its mod-

## Third Round Wage Hikes Underway

The third round of wage increases is well on its way in the automotive industries. Following the GM settlement at a figure considerably higher than the industry generally expected, Chrysler, Nash, Packard, Hudson, Kaiser-Frazer, Studebaker, Willys and Briggs settled for a flat 13 cents an hour wage increase. It is significant that to date not a single company has followed the GM "cost of living formula" which allows wages to rise and fall in accordance with the BLS index. The K-F agreement is the only one that differs signally from the others in that it establishes a social security fund to replace the \$5 per car bonus plan previously in effect. The bonus plan is estimated to have cost K-F about 3.6 cents per hour. Under the new agreement the company will pay five cents an hour for each hour worked by employees covered in the agreement into a social security fund. A board composed of company and union representatives is reviewing plans for setting up hospitalization, sick, and accident benefits; prepaid medical service; life insurance; and other social security benefits. The added cost or the new plan together with the 13 cents an hour raise brings the total cost to K-F to 14.4 cents an hour. In addition to hourly rate increases, the automotive companies are also granting raises to salaried personnel amounting generally to about a nine per cent increase.



# NEWS of the AUTOMOTIVE INDUSTRIES

## Wage Boosts Force Car Prices Up

The inevitable effect of the general rise in wages has already resulted in price increases. Packard has raised the prices of its cars by \$75 to \$200. Nash has also raised prices \$75 to \$90. Hudson announced price increases of from five to seven per cent ranging from \$95 to \$153 a car. A. E. Barit, president, said that the 13 cent wage increase adds nine per cent to the company's direct labor cost on every car built. Studebaker Corp. has raised prices of its passenger cars and trucks by an average of 5.5 per cent, with price increases ranging from \$65 to \$115. Prices of the 1949 model Ford are up 8.7 per cent, which is said to be higher than planned originally because of anticipated higher wage costs resulting from the industry pattern. GM has not yet raised automobile prices, but has increased GMC and Chevrolet trucks. In the Chevrolet line, trucks and commercial chassis are up \$45 to \$95 with corresponding increases on cabs, boxes, commercial bodies, and similar equipment. The increase in the GMC line ranges from \$10 on smaller chassis to \$110 on the largest units. Chrysler has also increased its prices on Chrysler cars \$75 to \$125; on DeSoto, \$79.25 to \$131.75; on Plymouth \$79.25 to \$95.25, and on Dodge, \$75 to \$120. The wage pattern is expected to spread through supplier industries with the result that higher costs are certain all along the line.

The following details the new 1949 prices, together with the increases over 1948 prices, for Packard, Nash, and Hudson:

PACKARD			
	1949 Delivered Price at Factory	Increase Over '48 List Price	
<b>Eights—</b>			
Club Sedan .....	\$2250	\$125	
Touring Sedan .....	2275	125	
De luxe Club Sedan .....	2517	167	
De luxe Touring Sedan .....	2543	168	
Station Sedan .....	3425	75	
<b>Super Eights—</b>			
Club Sedan .....	2502	137	
Touring Sedan .....	2827	137	
Convertible .....	3250	75	
Seven-passenger Sedan .....	3500	200	
Seven-passenger Limousine .....	3650	200	
Seven-passenger De luxe Sedan .....	3850	200	
De luxe seven-passenger Limousine .....	4000	200	
<b>Custom Eights—</b>			
Club Sedan .....	3700	75	
Touring Sedan .....	3750	75	
Convertible .....	4295	200	
Seven-passenger Sedan .....	4704	200	
Seven-passenger Limousine .....	4868	200	
NASH			
	1949 Factory List Price	Increase	
<b>600 Series</b>			
Two-door Business Coupe .....	\$1373.05	\$75	
Four-door Slipstream Sedan .....	1438.05	75	

Two-door Brougham (Super) .....	1433.05	75
<b>Ambassador—</b>		
Four-door Slipstream Sedan .....	1748.95	90
Two-door Brougham (Super) .....	1732.95	90

HUDSON			
	1949 Factory List Price	Increase	
<b>Super Six—</b>			
Three-Pass. Coupe ....	\$1855	\$ 93	
Brougham—Two-Door ..	1940	118	
Club Coupe .....	1985	118	
Four-Door Sedan .....	1988	118	
<b>Commodore Six—</b>			
Club Coupe .....	2130	133	
Four-Door Sedan .....	2153	133	
<b>Super Eight—</b>			
Club Coupe .....	2090	143	
Four-Door Sedan .....	2093	143	
<b>Commodore Eight—</b>			
Club Coupe .....	2230	153	
Sedan .....	2253	153	

## Big Three Shutdowns Riddle Record for June

Chances for a postwar record production month in June were blasted, when major producers of cars and trucks were forced to close down their plants for periods ranging from two days to a week. Ford was down three days because of a shortage of parts for new models. Chrysler was down a few days when a strike at a vendor plant shut off supplies. GM was hardest hit, when operations in virtually all assembly plants were halted one week by a shortage of steel. Many observers, however, think that July and August will be banner months, with a million new vehicles possible in that period. The one big cloud on the horizon, is the possibility of a coal strike. The effect of this would be felt much sooner than nor-

mally, because of the hangover from the stoppage in March and April of this year. Stocks have not been built up to the point where they would provide any safe margin.

There is still some hope of attaining the same production of cars and trucks this year as was reached last year, and some of the more optimistic forecasters believe that conditions will be stabilized enough during the last half of 1948 to surpass the 1947 mark. At the end of June, the industry was still ahead of the same point last year, but not so far ahead as it was two months earlier. Trucks are the surprising element in the production picture. In mid-June, truck production was more than 60,000 ahead of the same date a year ago.

## UAW Gets Wage Guarantee From Supplier

Although the UAW-CIO has run into a stone wall at all major automobile companies with demands for guaranteed annual wages, it has gained that objective in one contract with a parts supplier. Metal Moldings Corp. of Detroit has concluded an agreement with the union guaranteeing all employees with 10 or more years seniority 50 weeks work each year at regular hourly rates. The contract also granted a 13.5 cent increase across the board, plus three-weeks paid vacations for the 10-year seniority employees with pay 20 cents over the regular hourly rate while on vacation.

## NEW TRUCK REGISTRATIONS\*

Arranged by Makes in Descending Order According to the Three Months' 1948 Totals.

Make	March 1948	February 1948	March 1947	Three Months			
				Units	Per Cent of Total	1947	1947
Chevrolet .....	25,500	20,051	21,022	67,427	54,013	29.84	23.04
Ford .....	19,659	13,791	16,460	40,574	44,215	17.96	22.95
International .....	12,328	9,559	8,441	31,762	22,258	14.06	11.55
Dodge .....	10,993	8,615	10,456	26,392	28,022	11.68	14.55
G.M.C. ....	5,569	4,413	4,678	15,118	11,458	6.69	5.95
Studebaker .....	4,486	3,728	3,453	11,917	8,506	5.27	4.42
Willys-Jeep .....	3,927	3,453	2,732	11,142	7,407	4.93	3.85
Willys-Truck .....	1,776	1,222	.....	4,131	.....	1.83	.....
Reo .....	1,058	893	1,164	3,063	3,207	1.36	1.66
White .....	1,080	944	1,089	3,011	2,902	1.33	1.51
Mack .....	893	789	798	2,726	1,968	1.21	1.02
Diamond T .....	913	760	831	2,453	2,238	1.08	1.16
Divco .....	478	426	325	1,420	936	.63	.49
Federal .....	502	391	529	1,292	1,246	.57	.65
Brockway .....	323	312	312	934	1,092	.41	.57
Autocar .....	214	229	343	727	1,129	.32	.59
Crosley .....	241	88	.....	557	.....	.25	.....
F.W.D. ....	66	165	106	260	310	.11	.16
Ward LaFrance .....	36	45	48	126	166	.06	.09
Sterling .....	36	26	39	86	100	.04	.05
Hudson .....	24	21	375	77	818	.03	.42
Oshkosh .....	13	16	13	65	66	.03	.03
Kenworth .....	30	13	.....	60	.....	.03	.....
Nash .....	4	.....	.....	6	.....	.....	.....
All Others .....	190	185	219	622	570	.28	.29
<b>Total .....</b>	<b>90,339</b>	<b>70,074</b>	<b>73,433</b>	<b>225,948</b>	<b>192,627</b>	<b>100.00</b>	<b>100.00</b>

\* Data from R. L. Polk & Co., and are complete for all states with the exception of California for the first three months and Vermont for March.

# NEWS *of the* AUTOMOTIVE INDUSTRIES

## Willys Completes 80% of Forge Expansion

Part of Willys' total \$21 million expansion program, Willys-Overland Motors Forge Shop has achieved 80 per cent of its \$1.3 million expansion goal, and can now handle 80 million lb of steel annually. Currently, the Forge Div. is not only turning out 46 parts for Willys' vehicles, but about 30 per cent of its work is applied to outside orders. At its present stage in the expansion program, the Forge Div. now has 26 steam hammers ranging from 2000 to 12000 lb capacity; two open-frame blacksmith hammers; six hot-forging presses through a 1500 ton capacity; 12 upsetters; two forging rolls; and a No. 2 bulldozer. New hammers, presses and more induction heating units to be added in the near future will complete the expansion program.

## Gulf and Koppers Plan Joint Synthetic Fuel Research

Believing that the country's important synthetic liquid fuels program can be aided materially by combining the know-how and patent processes already developed in separate research, the Gulf Oil Corp. and Koppers Co., Inc. have announced the signing of an agreement under which the two companies will engage in cooperative research and development of processes for the conversion of coal to gas and liquid fuels. Work under the cooperative research program has already start-



## BUS LUXURY

Acme

During a showing sponsored by the Italian Automobile Club in Rome, Italy, this Fiat-built bus was exhibited. The bus seats 30 persons, is equipped with a bar and radio system, and features a top which can be moved back.

ed, according to General Brehon Somervell and Sidney A. Swensrud, presidents of Koppers and Gulf respectively. Gulf has long been a specialist in liquid fuels technology; Koppers has long been a specialist in solid fuels technology, and consequently they believe that it is only reasonable to anticipate that their knowledge in these two fields can be combined to develop more promising industrial processes for converting solid fuels into gases and synthetic liquid fuels.

## Fruehauf Adds Two New Models

The Fruehauf Trailer Co. has added two new models to its truck-trailer line: a Corrugated Van and a Depot Transfer unit. The Corrugated Van is of integral-frame construction with die-formed corrugated sections solidly welded together. It is available in either closed or open-top models, in 20-ft to 34-ft lengths, and with either single-axle or gravity-tandem underconstruction. The new Depot Transfer trailer is designed to step up city pick-ups and deliveries. The body has five rub-rails, and the rear bumper is deep and extends out beyond the body proper.

## Nash Buys Milwaukee Plant for Assembly Shipment

To be used as a shipping point for sub-assemblies and body stampings for the Nash assembly plant in El Segundo, Calif., and for assembly plants outside the U. S., a one-story building in Milwaukee has been bought for about \$500,000 by the Nash-Kelvinator Corp. from the International Trading Co.

Nash Motors has established a new department at its Milwaukee parts plant to develop methods of simplifying replacement parts. Principal purpose of the new service parts research and modification department will be to work out methods for substituting parts used in later models as replacement for older model Nash cars.



## BEING TESTED

British Combine

Now being tested by the British Ministry of Supply at Surrey, England, this prototype of a new British military jeep built by Nuffield, features independent torsion bar suspension for all four wheels. Powered by a flat four cyl water cooled engine, it has a maximum speed of 60 mph.

# NEWS *of the* AUTOMOTIVE INDUSTRIES

## TAKING AN UPPER

Consisting of an elevator platform at each end of the freight car, an "upper berth", designed by Crosley Motors' traffic department, increases the capacity of a boxcar so that eight lightweight cars can be transported in the space normally holding four standard weight cars. The automobile is placed on the platform which is lifted by chain hoists to the upper level.



## IHC Hikes Prices of its Wheel-Type Tractors

Rising material costs and other factors in production have forced the International Harvester Co. to raise the prices of its wheel-type farm tractors. The price raises range from 2.5 per cent to 14.8 per cent, with the average upward adjustment for the entire farm tractor line less than 10 per cent.

## Borg-Warner Leases Plant In Decatur, Ill.

Borg-Warner Corp. has leased plant No. 3 of the Mueller Co. of Decatur, Ill. consisting of buildings totaling 135,000 sq ft and 42 acres of land.

## Unveil New Swedish Jet Fighter

Scheduled for official flight testing later this summer, the jet-propelled J-29 fighter is Sweden's entry into the world's supersonic flight competition. The designers of the plane

claim that it is the equal of any American or British jet plane. It was inspected recently in Linköping, Sweden.

## Crosley Needs More Plant

Rising demand is making it necessary for Crosley Motors, Inc. to seek additional facilities to supplement the output of its Cincinnati, O., and Marion, Ind., plants. Powell Crosley, Jr., president, stated recently that it appears they are near the peak of labor and other facilities of Marion, and are looking for a plant of similar size and strategic location to speed the distribution of cars. Enabling the plant to step up production, an extension of the "make-ready" building at Marion will be completed by July 15. Increased demand from agricultural areas for the company's light-delivery and general utility trucks must now be met, and Mr. Crosley said that the same areas are showing new interest

in the 26.5 hp Cobra engine which powers the lightweight car.

## Continental Six Months' Net Is \$1.7 Million

In reporting earnings for the six months ending April 30, 1948, Continental Motors Corp. disclosed a net profit of \$1,724,411, subject to year-end adjustment, for the six month period, and sales of \$57,054,547. Comparable figures for the same period last year are not available because the financial results of the Wisconsin Motor Corp. are being consolidated for the first time in the current period.

## Lincoln to Get First Ford Automatic Transmission

Just what Ford Motor Co. is planning in the way of automatic transmissions was disclosed recently by Harold T. Youngren, Ford vice president and director of engineering, who said that Ford, working with Borg-Warner Corp., had selected a new improved automatic transmission for installation in Ford vehicles in the future. Stating that it would be first installed in the Lincoln, he revealed that it has fewer parts than automatic transmissions in use by other companies, and that it would be later offered in Mercury models and finally in Ford models.

## Navy Orders 12 More Martin Mercators

Bringing to 19 the current production schedule on the Mercator, the Navy has ordered 12 additional Martin P4M-1 Mercators. These 40-ton land-based patrol planes, designed and built by the Glenn L. Martin Co., offer a unique teaming of conventional engines and jet power.

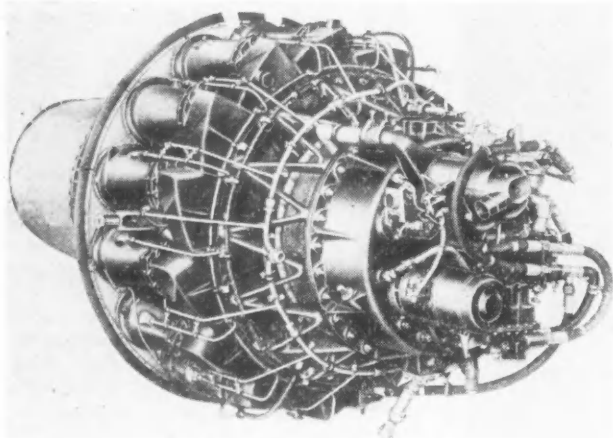
## SOUTHERN ASSEMBLY

Now in volume production, this new GM plant in Atlanta, Ga., with a roof area of over 17 acres, is building Buick, Oldsmobile and Pontiac passenger cars for Georgia, Florida, Alabama, Mississippi, South Carolina and parts of Louisiana, Tennessee, and North Carolina. The driving track can be seen at the upper right.





# NEWS of the AUTOMOTIVE INDUSTRIES



## GOING COMMERCIAL

The first jet engine to be licensed by the Civil Aeronautics Administration for commercial transport use, Model 400-C4 (J-33-211), made by GM's Allison Div., is 51 in. in diam; 103 in. in length (with tail pipe); and weighs 1850 lb. This engine has a take-off static thrust rating of 4000 lb, and a normal static thrust rating of 3200 lb.

or three years before the national show will be resumed. Location of the show, when it is held, has still not been settled. Considerable sentiment has developed for bringing it to Detroit, instead of going back to the traditional location in Grand Central Palace in New York City. However, suitable facilities for a show in Detroit are still a question, although it is believed that arrangements could be made, especially if resumption of the event is delayed for two or three years.

## GM Australian Subsidiary's New Car Nearly Ready

General Motors Holdens hopes to get its new Australian light car in production about Sept. 1. Development of the car has been delayed beyond original expectation by lack of experienced personnel. After initial production problems are solved, the company hopes to turn out cars at the rate of 20,000 a year, and to gradually step up to 40,000 annually.

## Ford, Nash & K-F to Exhibit at Wisconsin Centennial

Present indications are that Ford, Nash and Kaiser-Frazer will exhibit in the automotive exhibition at the Wisconsin Centennial Exposition to be held in Milwaukee, Wis., August 7-29. The Exposition, commemorating the 100th anniversary of the State of Wisconsin, will be held at the Wisconsin State Fair Park. The Park has many permanent buildings, and the Nash Exhibit will be housed in one of these. Ford is bringing in a pavilion type building which it has used in other cities for temporary exhibition purposes. The Kaiser-Frazer cars will be displayed in the Transportation Building.

Highlighting the automotive exhibit will be a cavalcade of approximately 100 antique cars. The cavalcade, the Glidden tour, will assemble in Chicago, the morning of August 12th, drive the 85 miles to Milwaukee that afternoon, and will be put on exhibition that night.

Production of a new Air Force trainer, the North American T-28, will also be located in the Los Angeles plant. The company's employment is now close to 21,000.

## No 1948 Automobile Show Planned

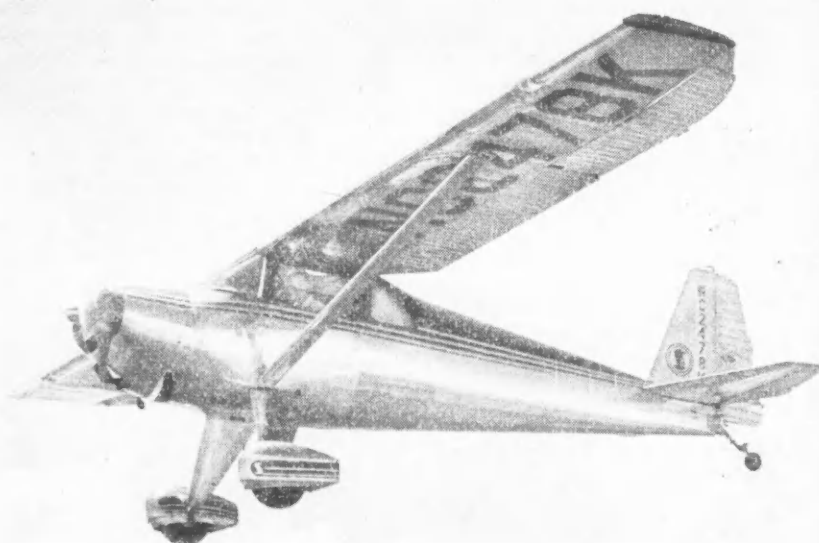
There will be no national automobile show this year, according to reliable information in Detroit. A member of the show committee reports that automobile sales managers are not even mentioning a show any more. J. R. Davis, Ford sales and advertising chief, said in a talk recently that he believes it will be two

## Merz Gets Right to J. & H. Electronic Equipment

The exclusive patent, manufacturing and sales rights to the Jack & Heintz' line of electronic inspection equipment has been acquired by the Merz Engineering Co. of Indianapolis.

## No. American Leases Plant in Downey, Calif.

The North American Aviation, Inc. has leased the complete aircraft plant facilities at Vultee Field, Downey, Calif. from the Consolidated Vultee Aircraft Corp. The plant will be used for the production of a new type of airplane, it was announced by J. L. Atwood, president of North American. Operations at the plant will require approximately 2500 persons by late this year. North American's operations will continue as usual at the Los Angeles plant, where production is starting on the Air Force F-86 fighter, and at the Long Beach plant which is in production on the Air Force's only operational four-jet bomber, the B-45.



## LUSTROUS LUSCOMBE

Luscombe Airplane Corp.'s new 1949 Silvaire De Luxe, which has been completely restyled, is powered by a Continental engine developing 90 hp. It has a cruising speed of 115 mph; a top speed of 128 mph, and a rate of climb of 850 fpm. It is priced at \$3395, fab, Dallas, Tex.

# NEWS *of the* AUTOMOTIVE INDUSTRIES

## Oldsmobile Running Tests on New V-8 Engine

The Oldsmobile Div. of General Motors currently has its new V-8 engine running in test cars throughout the country. Oldsmobile has remained silent on its plans, but it is believed likely that the new V-8 will be used through the Oldsmobile 8 line, rather than exclusively in the large 98, because of manufacturing economies. It is also believed that the division will continue with its present 6 engine, probably with some improvements, in order that it may retain its competitive position in the field.

tion for the domestic market, Mr. Davis estimated that it would total about 3.2 million in 1948, and that production for 1949 is as yet an uncertain factor, but another five million total car and truck production year seems likely. He said that for the market as a whole, it looks like new car buyers are going to stand in line at least until 1950, and possibly 1951.

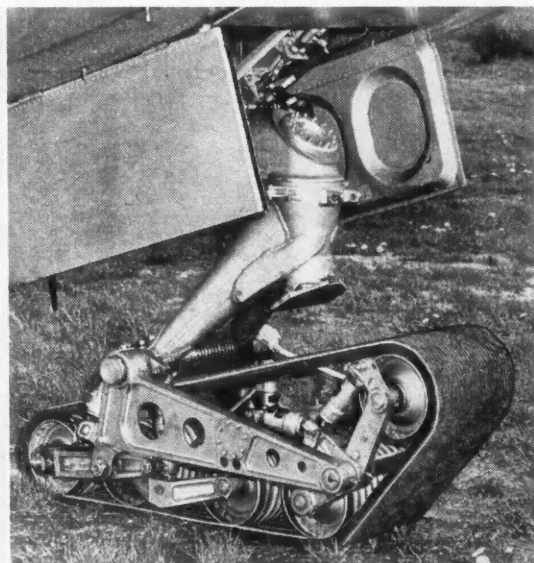
## Two New Loaders Made by American Steel Dredge

The American Steel Dredge Co.,

structures. The new buildings, of continuous strip-window design, will occupy a plot of about 600 ft frontage, and will include a three-story extension of the present office and assembly structure on a plot 254 ft by 100 ft; a one-story motor testing structure, 264 ft by 100 ft; a two-story shipping center, 143 ft by 100 ft; and a one-story rough cylinder storage house, 114 ft by 100 ft. The two one-story buildings will be of monitor-type structural steel framework construction and the two larger buildings of reinforced concrete construction.

## FLYING RUNWAYS

Completely retractable, Fairchild Aircraft's Flying Runway, a track-type landing gear, is shown at the right after a turf landing. The installation provides a 14-in. surface on the nose gear, and 19-in. on each main gear.



## Davis Predicts No Immediate Delivery Until 1950

Addressing the 25th anniversary meeting of the New York State Automobile Dealers Association recently, J. R. Davis, vice president and director of sales and advertising, Ford Motor Co., predicted that it would be 1950 at least before the average John Doe would be able to get immediate delivery of a new car from the average dealership, assuming full employment continues and other factors remain the same. With an actual total registration today of 31 million, he estimated that we should have today a total car population of around 38 million, and assuming continued full employment, that the normal car population should by 1953, increase around four million to about 42 million. He stated that we thus have a numerical shortage today of seven million passenger cars.

Regarding passenger car produc-

Inc., Fort Wayne, Ind., has disclosed that it has started production of its two new-type hydraulic loaders of welded steel construction. Both of these models, the FF and RC, are operated by a single hydraulic cylinder. The FF loader is designed for Ford-Ferguson tractors and operates from the rear of the machine. The model RC is designed for use on row crop farm tractors of two-plow capacity and over, and is mounted on the front of the tractor.

## Mack Expanding Facilities in Plainfield, N. J.

Mack Trucks, Inc. has started erection of four new buildings as additions to its existing engine manufacturing plant at Plainfield, N. J., as well as alterations to present

## Six Million Tooling Hours Spent on New Ford

An indication of the tooling job required for the 1949 Ford model changeover has been given by D. S. Harder, vice president and director of manufacturing. In *Rouge News*, Ford employe publication, he states that nearly six million hours of tooling went into the new Ford and that the company's total tooling cost for all cars, trucks, tractors, and buses amounted to about \$88 million.

## K-F Delivers Over 200 Cars from Driveway Cottage

With buyers from the West Coast accounting for 40 per cent of all deliveries, new car deliveries through Willow Cottage, Kaiser-Frazer Corp.'s new retail customer driveway building, recently soared well over the 200 mark.

(Turn to page 82, please)

**BUILT TO BE  
FORGOTTEN**  
*at this vital bearing position—*

**—6 makes of cars now equipped with  
NEW DEPARTURE Sealed-for-life  
Rear Wheel Ball Bearings**

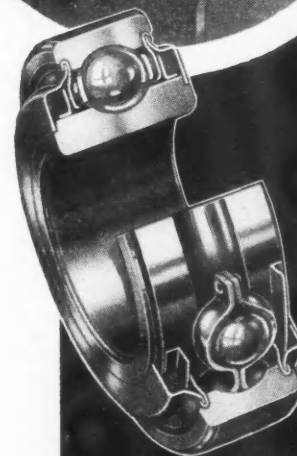
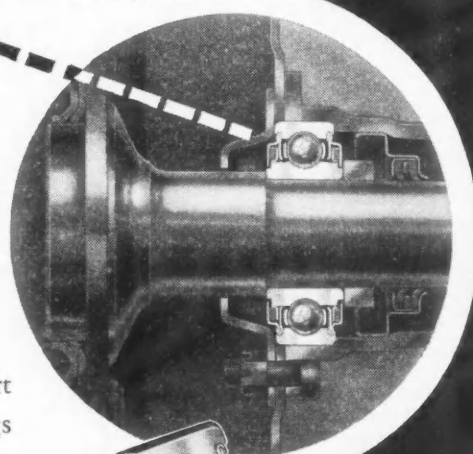
Unseen, but performing a vital service to your driving comfort and pleasure, New Departure self-sealed rear wheel ball bearings roll for the life of your car without lubrication—without service.

- No abrasive dirt can get in;
- No adjustments for wear.
- No grease can escape to cause slipping brakes.

New Departure originated the self-sealed ball bearing and now well over 126 million sealed bearings of various types are in service.

This year millions of cars will roll easier—smoother—on New Departure sealed-for-life rear wheel ball bearings. Will yours?

*A booklet of interest to automotive designers  
and owners alike will be sent on request.*



Proved by 14 years  
and billions of miles  
in actual service.

*nothing rolls like a ball*

**NEW DEPARTURE  
BALL BEARINGS**

NEW DEPARTURE • Division of GENERAL MOTORS • BRISTOL, CONNECTICUT





# Clear The Road

## For Free Enterprise

By Charles A. Schmutz

President, Standard & Poor's Corp.

**J**UDGED by the usual yardsticks, we have prosperity. Employment, national income, consumer spending and corporate profits have reached record levels since the end of the war.

But something is missing. Among responsible people you do not find the degree of long-term confidence which was associated in the past with good times. On the contrary, you find no little uncertainty, doubt, misgiving.

There are some obvious grounds for worry. One is the vast political and economic crisis brought upon much of the world by the ravages of war, the recasting of prewar social systems in a number of countries, and Communism's challenge to Western democracy.

Another cause for worry is the widely recognized fact that the foundations of the present business boom are in large measure fortuitous: namely, the unusual accumulation of demands built up during the war and the great increase in the country's money supply effected mainly by the Government's wartime deficit financing.

Were is not for these unusual circumstances, could we now have anything like full employment? What is there to keep us rolling when the catching-up demands are filled? Will the eventual outcome be a severe depression? If so, will popular pressures take us irrevocably down the road to State management of the economy?

These are real dangers. They have been increased by the war and the subsequent economic maladjustments. But their root causes go back some years. The fact is that since the 1929-32 depression—the first one from which the country never had a chance for full recovery under the normal functioning of private enterprise—the well-intentioned, but politically colored, policies of the Government have been gradually choking our capitalist system.

What is the capitalist system?

In a message to Congress in 1861, President Abraham Lincoln said: "The prudent, penniless beginner in the world labors for wages a while, saves a surplus with which to buy tools or land for himself, then labors on his own account another while and at length hires another new beginner to help him. This is the just and generous and prosperous system, which opens the way to all, gives hope to all, and consequent

energy and progress and improvement of conditions to all."

No recent President has said anything like that. On the contrary, too many of our people have been encouraged to look to the Government for their material welfare and security, although it can have nothing to give to any group except what it takes from another. It can be no more than a middleman in an exchange of favors.

To be sure, many things have changed greatly since 1861—but not human nature, and not the elementary principles involved in the production and exchange of goods and services by free people striving to get ahead through superior work, ambition and initiative. The magic key now, as in Lincoln's time, and before, is to work with hands or brains, individually, in partnership with others or through corporations, save a surplus, invest it productively; then make more, save more and invest more.

This beneficent process of saving and investing can never impose a final limit on itself so long as any considerable number of our people have yet to reach a living standard with which they are entirely contented, which is indeed a remote condition.

As long as it goes on in adequate degree, regardless of the temporary ups and downs of business, the long-run result is that the so-called common man is lifted higher and higher by the uncommon thrift or enterprise or genius of the gifted minority. The wealth garnered by the latter in the aggregate is not at any expense to the common man, but to his benefit. To illustrate, the late Henry Ford was a very rich man, but what he made for his family was small compared with what his enterprise enabled millions of others to make and save. It differs only in degree. Every successfully productive business, large or small, benefits the country.

Although there is no foreseeable natural limit to the fruitfulness of our private enterprise system, arbitrary limits can be, and have been, imposed on it. This should really worry (*Turn to page 78, please*)

# Latest Innovations at

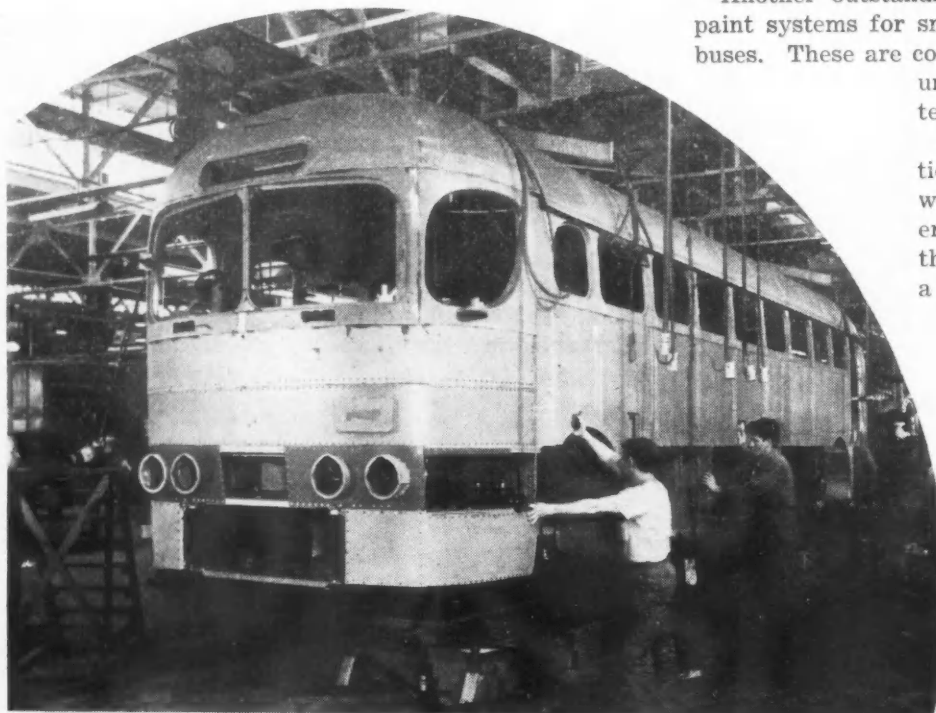
**A**S ONE result of its postwar expansion program designed to meet the greatly accelerated tempo of bus production today, the coach making operations of GMC Truck & Coach Div., General Motors Corp., Pontiac, Mich. are now housed in two separate buildings, one assigned to the manufacture of inter-city buses for Greyhound, the other, an enormous structure, set up for producing transit coaches and parlor coaches on two separate lines. The latter plant also houses a comprehensive press shop producing stampings for both plants.

Because of the scope of the coach operation and the many innovations introduced it is necessary for the writer, in an article of this kind, to make an arbitrary selection of outstanding features. The accompanying illustrations taken in both plants should, however, enable the reader to visualize the general character of the set up.

Easily its most impressive feature is the new materials handling system which includes the installation of hoists and elevators for transporting sub-assemblies as well as complete buses, thus greatly facilitating their movement from one assembly station to another.

Another outstanding development is found in the paint systems for small parts and even for complete buses. These are completely organized self-contained units representing the latest known techniques.

As examples of advanced practice in building coach structures we have selected a group of operations in the plant devoted to the Greyhound bus. This coach is a unitized structure fabricated al-



*(Left) Here the basic Greyhound coach structure is fairly well completed by integration of the superstructure, understructure, and front-end section. This illustrates the new technique of elevating the entire body by means of the overhead hoist mechanism, ready to move to the next station.*

*(Right) One of two enormous turntables is shown about to transfer a coach from the end of the assembly line onto the conveyor in the background to start its journey through the paint shop.*



# GMC Bus Plants

**New Production Facilities Introduced during Expansion Program, Including Materials Handling System with Hoists and Elevators for Transporting Sub-Assemblies and Complete Buses. Operations Now Housed in Two Separate Buildings.**

By Joseph Geschelin

most entirely of aluminum alloy sheet, extrusions, and curved sections. There is a striking similarity, in the methods employed here, to the mass-production techniques developed during the war for building large airframes.

Greyhound assembly begins with the integration of the entire super-structure which is assembled from pre-fabricated sections on an enormous framing fixture located in a pit at the start of the line. Sub-assemblies are fed to this station from the sides. One of the largest of these is the curved rear-end section which is built up in massive fixtures at this point. The entire assembly line, from end to end, is traversed by overhead

rails carrying the hoist mechanism for moving the structure from one station to another. This is true also of the other assembly lines.

Parallel to the line referred to here is an assembly

(Right) Close-up of one of the stations of the unique paint shop operation. The coach at the right marks the end station of masking operations. The coach at the left is in the paint booth, one section of the divided spray booth designed by Newcomb-Detroit being seen between the two coaches.



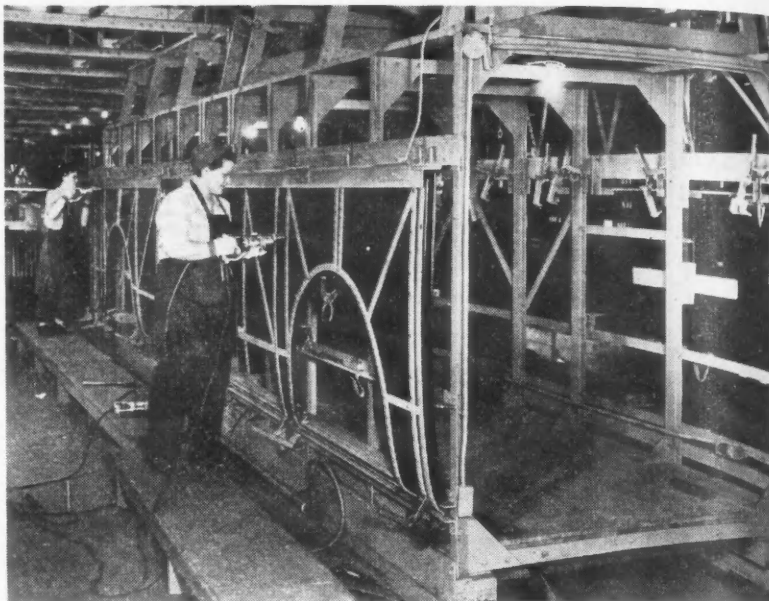
(Left) Perspective of the long straight line power-driven conveyor for transporting transit and parlor coaches in side-wise position at GMC. The conveyor carries the coaches through the paint shop operations at the extreme left in the background to the final stations in the foreground.



**Side panels for transit and parlor coaches are built as sub-assemblies on the fixtures shown here, reminiscent of airframe assembly fixtures.**

line for the under-structure which is made up as a self-contained sub-assembly and later transferred to the main line for attachment to the super-structure.

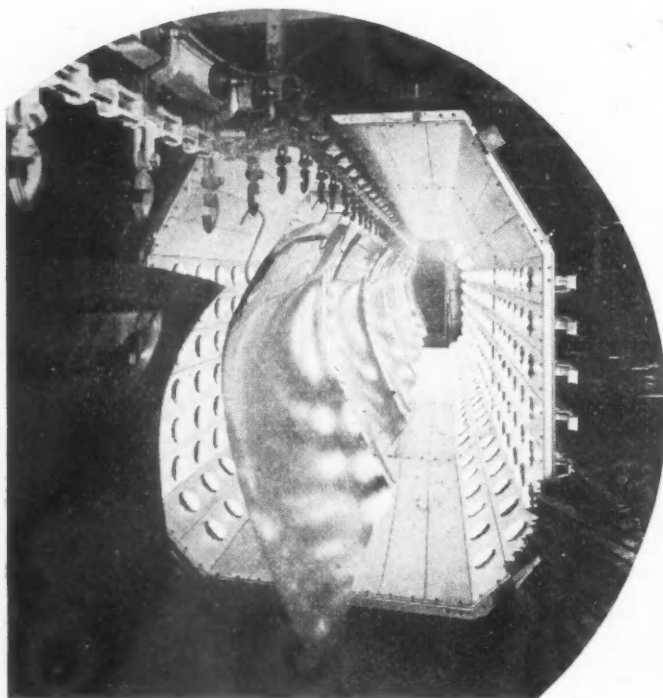
The main assembly line has five major assembly stations, the second station being used for joining the superstructure to the understructure and completing the addition of the front-end sub-assembly. The front-end assembly is built up progressively on fixtures in a section adjacent to the assembly line, the sub-assembly stages being transferred from one fixture to another by an overhead hoist moving on a curved overhead rail.



At the third station the body structure is ready for the installation of axles, wheels, main propulsion assembly and other running gear elements. This station contains the body over a pit and is provided with a mechanically operated elevator mechanism to hold the body in a raised position while running gear parts are installed, and later to lower it with its wheels on the rails.

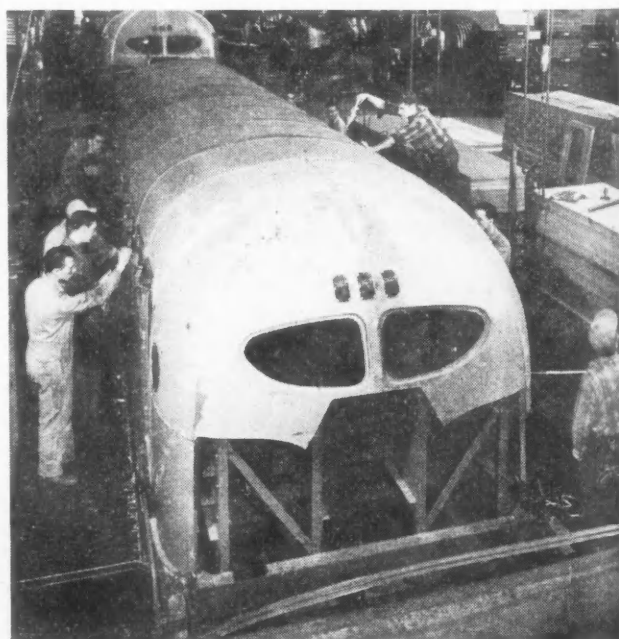
At the fourth station the coach is moving on its own wheels and is pulled along by means of a chain attached to the front end. The last station is over a pit to facilitate the application of the underbody protective coating.

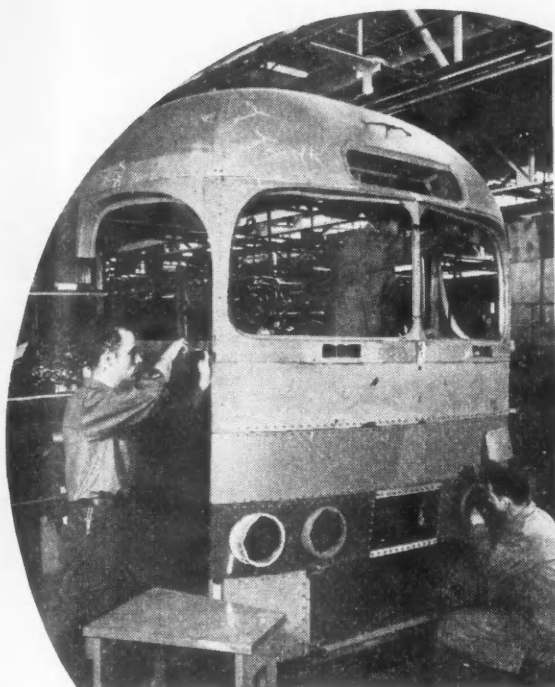
At the end of the line the coach is transferred to a conveyor consisting of two parallel gravity roller tracks to facilitate movement through the paint spray booths and drying ovens. Upon emerging from the paint line



(Above) Large sheet metal parts for transit and parlor coaches are put through a long Bonderizing unit, then dried after the application of primer in this modern infra-red tunnel oven. As on the small parts paint lines the work is transported from start to finish on a continuous overhead conveyor.

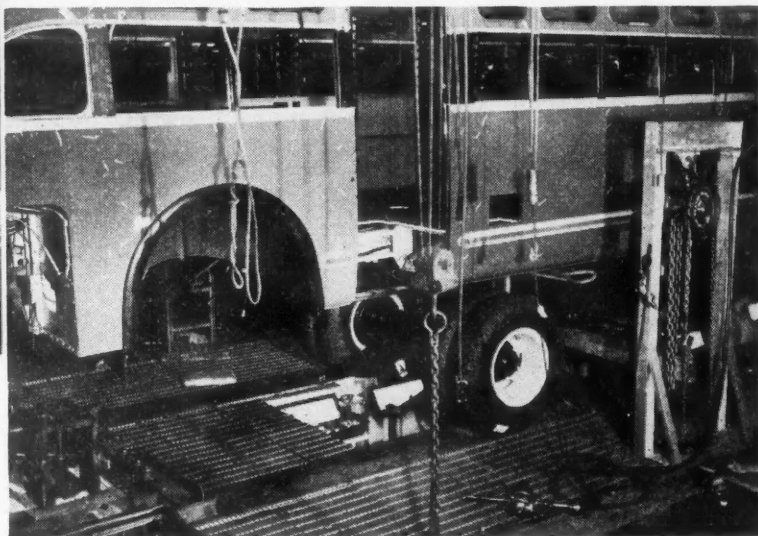
(Right) First major coach assembly operation on the Greyhound Silversides line is seen here. The rear end top section, prepared in fixtures at the extreme right—out of this view—is installed in the massive framing fixture shown in the pit. To this are added the skin sections and other structural elements. Upon completion of this operation the structure is lifted upward by means of the hoist mechanism overhead and transported to the second operation at the left.





(Left) This is one of the assembly stations on which the front-end sub-assembly is fabricated.

(Below) The pit station for the installation of the powerplant and running gear is shown here to give a view of the elevator mechanism used for raising and lowering the coach. Two elevators are installed at this point—one for the front, the other for the rear.



the coaches travel on the final finishing line for installation of glass, stainless steel trim, front step, and interior fittings. Prior to completion of the interior the coach passes through an enclosed booth built over the line and is subjected to an intensive water test.

Finally the coach moves into an enclosed booth over a pit where the engine is tuned and started and the coach then travels under its own power for inspection and road testing.

It may be noted at this point that the attachment of panels, structural sections, and other fastenings is done by riveting, using aluminum rivets. Small rivets are driven by portable riveting hammers, while large rivets for the attachment of forgings and large members are squeezed cold or hot headed as the case may be. There is also an extensive use of blind rivets of several types, one type being used exclusively for the attachment of exterior trim panels of anodized aluminum.

In the larger plant where they build the general line of parlor coaches and transit coaches, the most impressive feature is the unique arrangement for painting complete coaches. The building is so large that it permits moving the work sidewise. This results in major space economy since it permits a cyclic movement of at least 50 coaches along a single straight line.

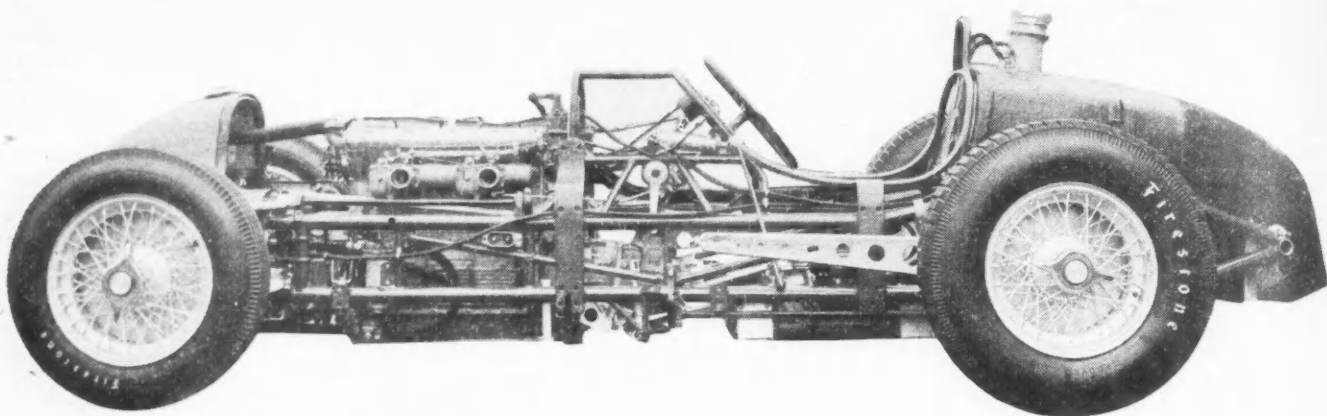
As illustrated, coaches built on each of the two major assembly lines are rolled onto an enormous turntable as they come off the line. By this means the coach is transferred in a sidewise position onto a slat conveyor built in at floor level. The coaches remain on this power-driven line until they are ready for road test.

The paint line is designed to function as a unified operation according to a timed cycle interrelated with the cyclic movement of the floor conveyor. Briefly it can be said that the unit consists of five, Newcomb-

Detroit water-wash spray booths and five Newcomb-Detroit drying ovens which are steam heated, fed with filtered air, and measure roughly about 36-ft wide and 60-ft long. Each oven is of the three compartment type, permitting the work to be held in an oven for the duration of three cycles of movement of the conveyor.

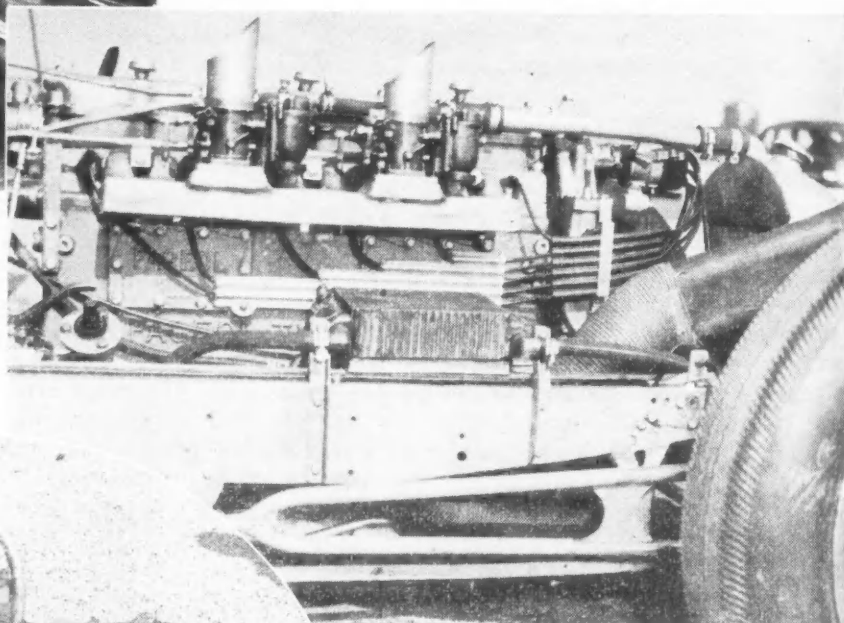
The spray booths are of unique design. Each is in the form of a partially enclosed canopy, made in symmetrical halves suspended independently from the ceiling. Each of the halves is independently operated and each has an independent and self-contained water-wash curtain, filtered air supply, and exhaust duct. Having two operators for each spray booth station makes possible the movement of a spray booth on each side of the coach which travels from one end of the body to the other. Moreover, in addition to freedom of movement lengthwise, each spray booth section is fitted with a mechanically operated elevator which permits an operator to start at floor level and progressively move his working level above the roof. Thus the two operators can readily sweep the entire contour of a coach from one end to the other and from the roof level to the lower edges of the side panels.

This arrangement has other unusual advantages. For example, the operator can regulate the lengthwise movement of the canopy to the proper speed to sweep the roof panel or a side panel section with about the same effect as an automatically operated spray gun mechanism. Similarly, if the canopy is held stationary but the elevator is arranged to move vertically at a selected (Turn to page 76, please)

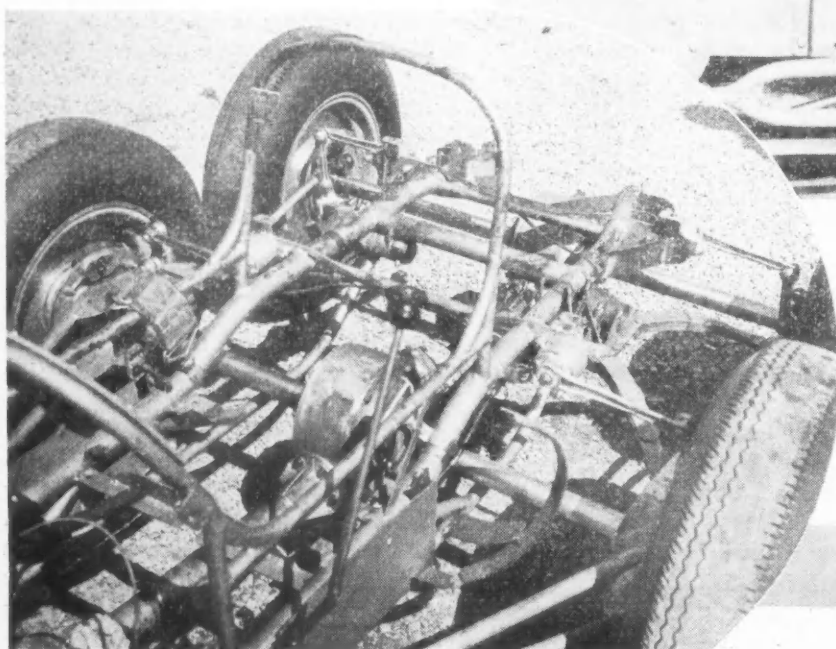


(Above) Close-up of one of the brakes on the City of Tacoma Special driven by Hal Cole. The front axle is made up of welded tubing.

## Mechanical of Indianapolis



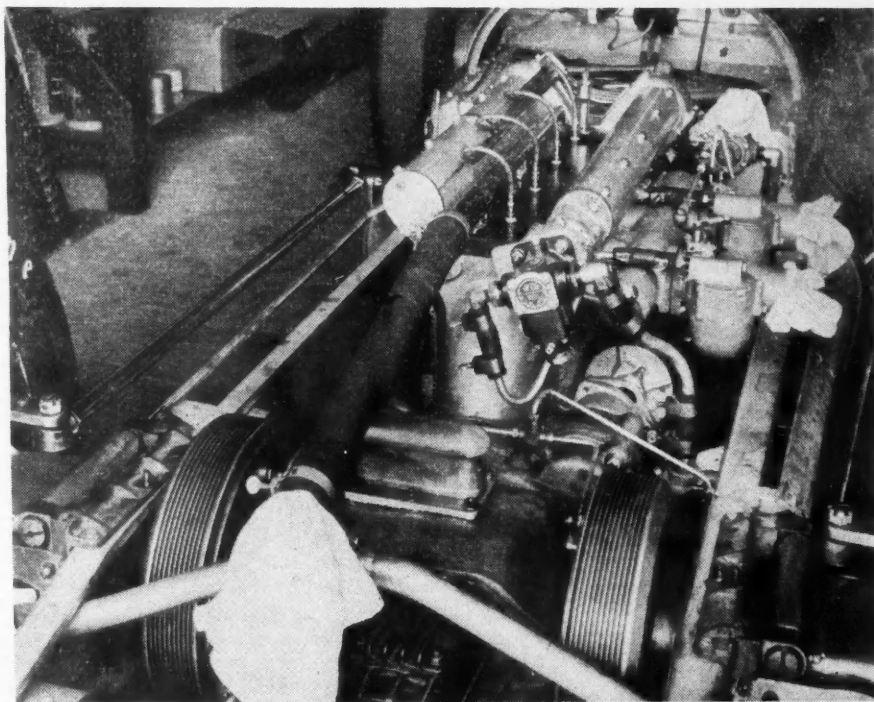
(Above) Here is a view of the right side of the Fageol Twin Coach Special engine. With the exception of the Flavell Special, this was the only six-cylinder car qualified.



(Left) Unusual arrangement of two rear axles in the Pat Clancy Special driven by Billy Devore. Note the quarter-elliptic leaf spring suspension.

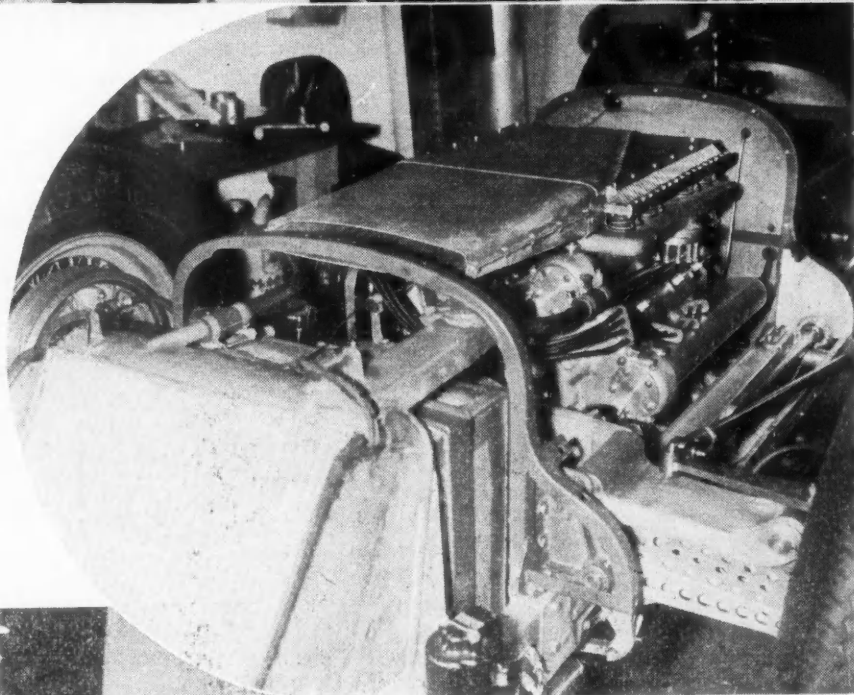


(Top of facing page) The tubular frame construction of this Kurtis-Kraft Special is clearly seen in this view of the left side of the chassis. The engine is a 270 cu-in., four-cylinder Offenhauser.

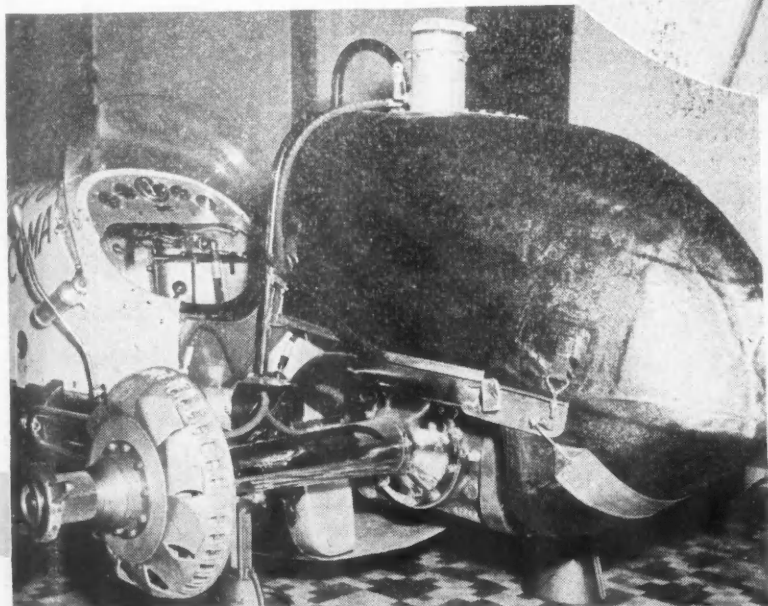


## Features Race Cars

(Upper right) Offenhauser engine in Bill Holland's Blue Crown Spark Plug Special. This four-cylinder, 270 cu-in. power plant is the same as that in the winning car driven by Mauri Rose.



(Right) The Novi Grooved Piston Special has an eight-cylinder engine with overhead camshafts. Torsion bar springing is employed for the independent front wheel suspension.



(Left) The fuel tank and brakes of this City of Tacoma Special follow airplane-type construction. This car is equipped with a quick-change rear axle which provides for speedy changes of ratio to suit track conditions.

**Greyhound's Research Bus and Latest Army Vehicles Demonstrated to Engineers at SAE French Lick Meeting. Symposiums on Engine Design, Operation and Octane Number Economy Feature Excellent Papers and Lively Discussions.**

# Three Experimental of Revolutionary

**By James R. Custer**

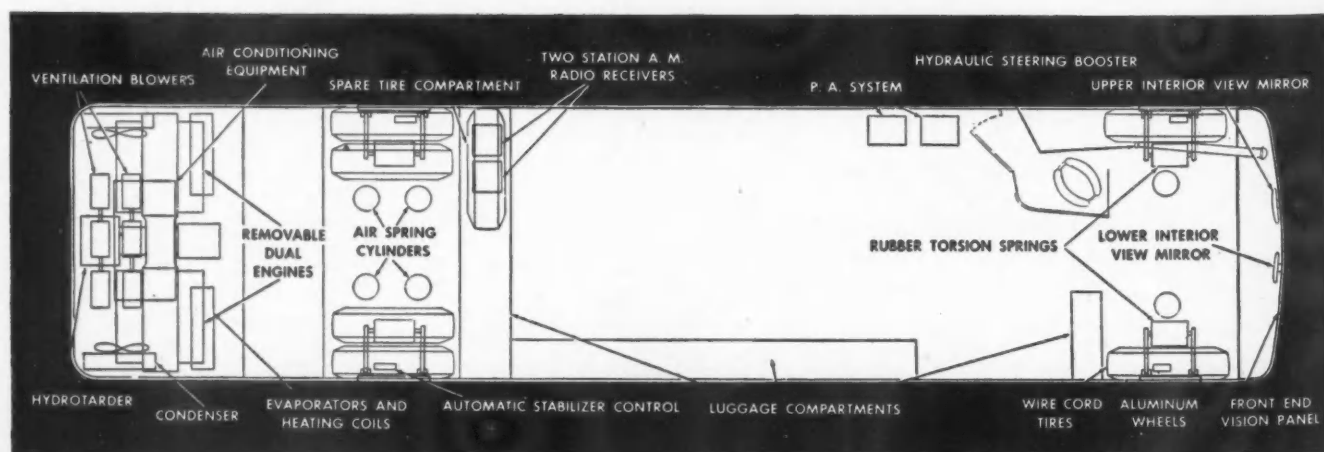
**T**WO of Uncle Sam's latest military vehicles, Greyhound's new 50-passenger experimental bus, and 17 technical sessions were the main attractions at the summer meeting of the Society of Automotive Engineers held early in June at French Lick, Ind., where hundreds of engineers from various sections of the country assembled for the six-day event.

Interspersing the program were sports, social events, and numerous committee meetings. The SAE plans to return to French Lick for its summer meeting in 1949.

Of the technical sessions, the three symposiums proved to be very popular. Two of them dealt with new automobile engine design and cold weather operation of military aircraft. The latter symposium, sponsored by the U. S. Air Force, was a closed session, most of it being devoted to problems of preheating and



*Greyhound's new experimental bus, Highway Traveler, was available for inspection and demonstration. Hundreds of SAE members and guests studied its features and experienced the superior ride given by its combination of air and rubber suspension systems. The line drawing shows the location of the principal chassis units.*



# Vehicles Design



*Flanked by past presidents of the society, SAE President R. J. S. Pigott (arrow) presided at the banquet that opened the 1948 summer meeting at French Lick. Wilbur Shaw (sitting at President Pigott's right), Indianapolis speedway president and three-time winner of the "500" race, was the principal speaker.*

starting engines in weather temperatures down to 60 or more degrees below zero.

In light of the present motor gasoline supply and the petroleum situation in general, the third symposium was very timely, the theme of which was octane number economy from the use of alcohol-water anti-detonant injection or the dual-fuel system. The three papers on those subjects were followed by lively discussion with 14 engineers participating. Both meth-

ods are considered sound engineering-wise, but undetermined are their economic feasibility and the degree of public acceptance. Highlights of this symposium will be summarized later in this article.

What can be accomplished with unconventional design in motor vehicles was amply indicated in the Greyhound bus and the two cargo carriers of U. S. Army Ordnance. These vehicles contain a number of engineering innovations in their respective fields

and there was much favorable comment by engineers who inspected them and rode in them. Especially were their ride qualities exceptional and advanced over those of conventional vehicles of similar types. The bus, suspended on air and rubber springs, provided a flat soft ride with the body insulated by the springing from road and chassis vibration. On the other hand the ride of the cargo carriers was outstanding on rough terrain due to the deep wheel

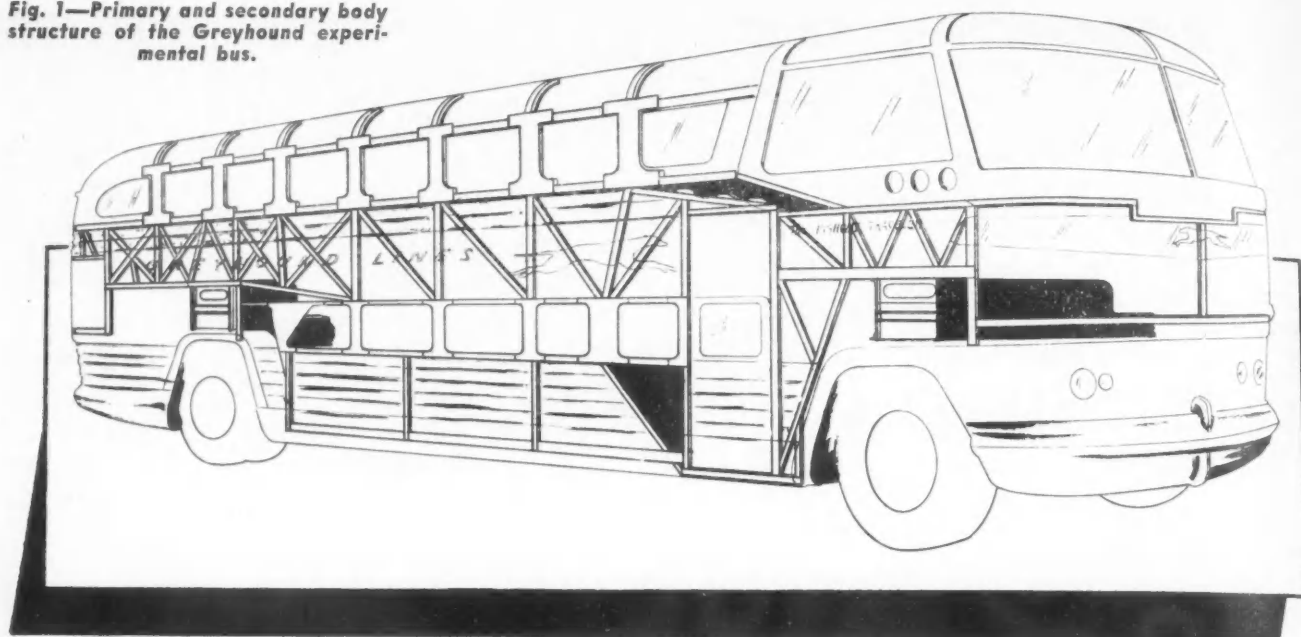


*These all-wheel drive cargo carriers were designed and built at the Detroit Arsenal of U. S. Army Ordnance in collaboration with automobile company engineers. The T53 (above), a 3/4 ton 4 x 4, and T51 five-ton 6 x 6 (right) incorporate advanced engineering features based on Army experience. Both are powered by aircooled engines and have torsion bar suspension.*





**Fig. 1—Primary and secondary body structure of the Greyhound experimental bus.**



travel made possible by their torsion bar springing.

The advocates of aircooled engines for motor vehicles might well claim that it was no mere coincidence that these experimental vehicles developed by different engineering groups in different cities should be powered by aircooled engines. The Greyhound bus has its two engines mounted at the rear while each of the Army vehicles has its engine at the front. However, at present these military aircooled engines have one handicap—the lack of mass production facilities in case of an emergency.

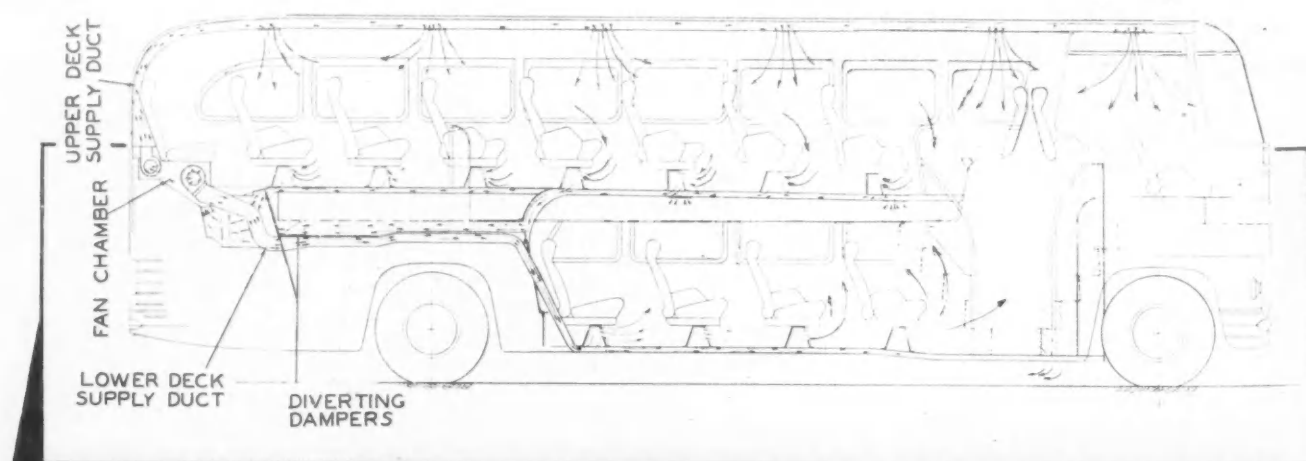
#### America's Newest Military Vehicles

During World War II when American wheeled vehicles were used in tactical assignments, many failed

because they were not built for that type of operation. Tracklaying vehicles were much more successful and U. S. Army Ordnance has adopted the medium cargo tractor as standard equipment for tactical work and at present International Harvester is working on the development of a light cargo tractor. Two faults of wheeled vehicles in World War II were their conventional differentials, which permitted slipping of the least tractive wheel, and their low ground clearance.

Knowing the shortcomings of previous wheeled vehicles and advantages of that type for tactical use, Army Ordnance in 1946 launched a project at its Detroit Arsenal to exploit their full potential, several of which have been designed and built. Col. Joseph M. Colby, head of tank-automotive engineering and development at the Detroit Arsenal, told the SAE members about the design problems and the accomplishments to date. The two cargo carriers demonstrated during the meeting were the T 51 and T 53. The T 51, a 6 x 6 vehicle having a load capacity of

**Fig. 2—Sectional drawing of Greyhound bus showing air circulation system and the three passenger compartments. Conditioned or fresh air is distributed from a plenum chamber equipped with electrically driven blowers. The automatic electro-pneumatic control system has a sensing element that translates temperature into vapor pressure.**



five tons, was engineered by General Motors and the T 53, a  $\frac{3}{4}$  ton 4 x 4, by Chrysler.

Both vehicles are powered by aircooled engines. They are equipped with hydraulic torque converters, independently suspended wheels with torsion bar springs, central tire inflation systems, sealed brakes, automatic locking differentials, and 24-volt electrical systems. The sealed brakes are of the external type, the drums being located at the outside of wheel disk, which permits easy accessibility to the shoe mechanism without removing the wheel. There are in use two types of air lines to the tires, one a concealed type on the T 53, and the other with the lines mounted externally from the body to the wheel hubs of the T 51. The former most likely will be adopted as standard equipment.

Aircooled engines are being developed for Army motorized equipment, a recommendation of a special board of investigation, because of the requirements of extreme temperature operation. Hydraulic torque converters also have been found more satisfactory for these military vehicles.

An important requirement of tactical vehicles is high ground clearance. This is being accomplished on these new cargo carriers by using flotation tires and torsion bar springing, which permits deep wheel movement and has high shock absorbing capacity, the movement being controlled by double acting shock absorbers. Each wheel of the Army's new T51 cargo carrier is equipped with primary and secondary torsion bars.

An aircooled eight-cylinder opposed engine of 536 cu in. displacement and 250 hp powers the T 51 five-ton vehicle of 15,850 lb curb weight, which is 2200 lb less than its World War II counterpart. Its top speed is 55 mph. The engine, located at the front end of chassis with the crankshaft in a vertical position, weighs 770 lb as compared to 2400 lb for a water-cooled unit of the same horsepower, including its cooling system. The T 53 has a six-cylinder, horizontally opposed engine of 187 hp.

Army Ordnance has under development for motorized vehicles 12 aircooled engines in power outputs from 125 to 1040 hp using two basic cylinders with all high mortality parts interchangeable. For driving auxiliary equipment, five aircooled engines are being developed up to 100 hp.

#### Greyhound Bus Details

Greyhound developed its new inter-city experimental bus for increased efficiency in bus line operation. Its configuration and styling were designed in collaboration with Raymond Loewy Associates. Outstanding among its unusual features is that it has three separate compartments, two on the upper deck and one on the lower deck, with

total seating accommodations for 50 passengers. The following description was provided by Milo M. Dean, Greyhound Chief Engineer.

The only over-all dimensional increase in the size of the new bus over present standard equipment is the 14-in. increase in height which gave a 12 per cent larger body envelope than the standard bus. This greater space and new design made possible a 35 per cent increase in seating capacity, greater seat center spacing, wider seats, 50 per cent increase in engine horsepower, 50 per cent increase in air conditioning plant capacity, 100 per cent increase in electrical power plant capacity, two-way radio communication and two standard broadcast radios for passenger utilization, air and rubber springs of better ride characteristics, power hydraulic brakes, hydraulic steering booster, toilet facilities, drinking water fountain, snack bar and refrigerator facilities, plus adequate aisles and stairways, roomy vestibule, and six luggage compartments. The accompanying sketch shows the location of the important chassis units.

Body structure is of semi-monocoque design in which the sides of the bus ultimately receive all loads and transmit them to the suspension points. The primary structure (see Fig. 1) consists of steel trusses of square and rectangular 4130 steel tubing with all connections arc-welded and stress relieved. They are located between the upper and lower windows on each side of the bus with connecting trusses around the fore and aft ends. This primary structure also carries the upper window posts to the roof and the lower window posts down to the lower side structures.

For the most part the secondary structure, including the roof, cross beam between the side trusses and side sheeting, is fabricated from aluminum alloy. Floors are made of metal covered plywood, supported on aluminum stringers and cross beams. The front end is protected from collision damage by a substantial shear plate which is also used as floor in the forward compartment. A relatively thick wrapping plate is fitted at the front end. The front bumper

TABLE 1—Vitameter Anti-Detonant Consumption

TYPE OF FLEET	No. of Vehicles	A.S.T.M. Motor Octane Number of Base Gasoline	Road Octane Number Increment Added	Anti-Detonant	Gallons of Anti-Detonant per 100 gal. of Gasoline
Tank Trucks in Bulk and Home Delivery Service	188	63	8-12	45% Isopropanol†	5.5
Tank Trucks in Bulk and Home Delivery Service*	188	63	8-12	85% methanol†, 3 cc tetraethyl lead	2.0
Tank Trucks in Bulk Delivery Service	23	59	19-23	85% methanol†, 3 cc tetraethyl lead	5.2
Tank Trucks in Bulk Delivery Service*	23	65	12-14	35% methanol†, 3 cc tetraethyl lead	2.8
Tank Trucks and Trailers	10	59	19-23	85% methanol†, 3 cc tetraethyl lead	11.8
Tank Trucks and Trailers*	10	65	12-14	85% methanol†, 3 cc tetraethyl lead	6.4
Taxicabs and Airport Limousines	65 }	58	18-25	85% methanol†, 3 cc tetraethyl lead	4.0
Taxicabs and Airport Limousines*	23 }			85% methanol†, 3 cc tetraethyl lead	
		65	12-17	85% methanol†, 3 cc tetraethyl lead	2.2

\* Estimated.

† Remainder water.

supports tie in with the lower front end construction and the lower floor, forming an efficient structure for impact resistance. The rear bumper supports are of truss construction connecting to the steel side trusses and are removable for access to the power plant and removal of the engine assembly that is suspended from a permanent steel structure across the bus.

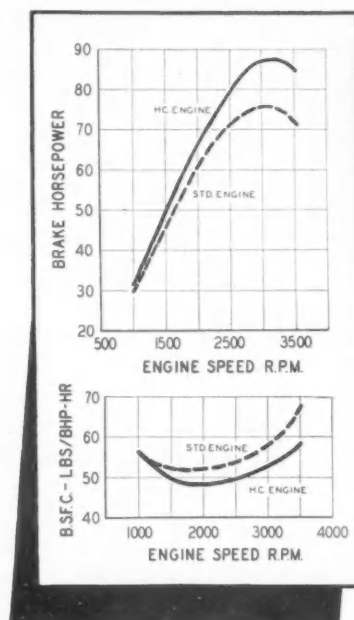
Power is supplied by two horizontally-opposed aircooled engines, each having a rated output of 154 hp at 2500 rpm. They were built by Aircooled Motors. The two engines are located at the rear of the bus with a transfer case between them. The transfer case mainshaft drives forward into a conventional four-speed transmission and a propeller shaft with a constant velocity universal joint completes the drive to the rear axle made by the Clark Equipment Co.

From the transfer case, which comprises a gear box and two clutches, connecting the two engines together at their flywheel ends, is also taken power to drive the accessories that are mounted on an accessory drive transmission above the power unit. One engine, called the main engine, is fitted with a standard automotive manually-operated clutch normally engaged and the other engine, called the accessory drive engine, has an automatic clutch normally released and operates at a constant speed. This arrangement permits the bus to be powered by the main engine alone, using the other engine as a standby power unit.

When the bus demands power greater than that of the main engine, the automatic clutch engages the accessory drive engine and as that engine reaches the speed of the main engine it transmits power to the drive through an overrunning clutch, which is a part of the automatic clutch. Under these conditions the mechanism automatically provides for operation of the accessories at the same constant speed as previously. The accessory drive power takeoff also is so arranged that the accessories may be driven from either one of the two engines and either one of the two engines may also handle the bus drive alone to reduce to a minimum the possibilities of complete road failure.

The accessory drive can be transferred to the main engine by a shift lever on the transfer case and the bus drive can be transferred to the accessory drive engine alone by locking out the manual main engine clutch. The accessories consist of two 200 amp d-c generators that supply current for the 12-volt battery electrical system, air compressor, brake and steering hydraulic pump, freon compressor and a condenser fan drive.

**Fig. 3—Full throttle horsepower and brake specific fuel consumption curves for Chevrolet stock and 9 to 1 C. R. converted engine tested by Standard Oil Co. (Ohio).**



The suspension system consists of a combination of rubber torsion springs developed by U. S. Rubber Co. and air springs. Each wheel is suspended by a rubber torsion spring mounted at the outside edge of the bus body above the wheel well and at a comparatively high level near the center gravity. There are two air-spring cylinders near the front axle and four near the rear axle. About 75 per cent of the light weight of the bus is carried on the rubber springs and the remainder of the light weight and all passenger and baggage load is carried on the air springs. Air pressure in the air cylinders is adjusted automatically in accordance with the passenger and baggage load, thus providing the same ride regardless of the number of passengers, and also maintaining the body at a predetermined road clearance within reasonably close limits. Double acting shock absorbers are used for damping the spring system, being mounted to give both

vertical and lateral control. Constructional details of the drive system and rubber-torsion-air spring suspension will be presented in an early issue of **AUTOMOTIVE INDUSTRIES**.

The compressed air system, which operates the spring suspension air cylinders, air conditioning controls and the radio antenna, have supply tanks that carry a maximum pressure of 120 psi. Wheel brakes, Vickers steering booster, windshield wipers and the gearshift of the accessory drive transmission are operated by the hydraulic system, which has two vane type pumps, one for the brakes, windshield wipers and the gearshift device, and the other for the steering booster.

Some other outstanding engineering features are the 125 gal Firestone rubber fuel tank of modified aircraft type, aluminum wheel hubs, aluminum wheels that save 350 lb, and wheel brakes of Twin Disc Clutch Co. design made by Bendix Products. The newly-developed air conditioning system circulates warm or cooled fresh air according to the season as shown in Fig. 2 and is controlled by an electro-pneumatic system. The amount of air circulated during heating and cooling sequences is 1800 cfm, of which 600 cfm is fresh air. During the ventilating sequence the circulation is increased to 3000 cfm, all fresh air. The heating unit is a special gasoline fired fluid medium heater, automatic in operation and having a rated output capacity of 150,000 BTU per hr. The refrigerant compressor, which has a six-ton nominal capacity, also supplies the cooling demand of the drinking water fountain and refrigerated lunch locker.



## Anti-Detonant Injection Data

Further test data on the Thompson Vitameter method of anti-detonant injection (see AUTOMOTIVE INDUSTRIES, Jan. 15, 1948, page 32) and on the dual-fuel system developed by Socony-Vacuum research engineers (see AUTOMOTIVE INDUSTRIES, Feb. 1, 1948, page 36) were given at the symposium on supplemental anti-knock methods, for use with current and future high compression engines. C. H. Van Hartesveldt, vice president of the Thompson Vita-Meter Corp., supplied the data in Table I for Vitameter service installations, showing the amount of alcohol-water anti-detonant solution used per 100 gal of gasoline.

For its tests with Vitameter equipment, The Standard Oil Co. (Ohio) converted a 1947 Chevrolet engine of 6.5 to 1 compression ratio to give it a 9 to 1 C. R. In addition to installing pistons of new design to make the compression ratio change, this high compression engine also was equipped with connecting rods and bearings of advanced design, stellite-faced exhaust valves, improved type distributor, spark plugs, ignition coil and carburetor.

R. I. Potter, Chief of the SOHIO Fuels and Lubricants Service Division, reported the results of extensive testing with the engines. For a study of fuel consumption with the stock and high compression engines driven on trips under the same conditions, the following data were obtained for the high compression engine with Vitameter anti-detonant injection:

	Cross Country	City
Mileage per gallon of gasoline .....	22.2	19.1
Percentage increase over stock car mileage....	13.7	20.1
Per cent anti-detonant* to gasoline used .....	2.9	8.8
Miles per gallon of anti-detonant .....	771	220

\* 85% methanol, 15% water, 3cc tetraethyl lead per gallon

Dynamometer testing of the Chevrolet engine at full load and best spark advance showed the 9 to 1 converted unit to have 15 per cent greater maximum horsepower than the standard engine. The full throttle horsepower curves over the speed range are given in Fig. 3. At the same time there was a decrease of about eight per cent in brake specific fuel consumption, of the high compression engine as shown in Fig. 3. Fig. 4 gives the level road acceleration time for the standard and high compression Chevrolets, using premium gasoline in both cars with the addition

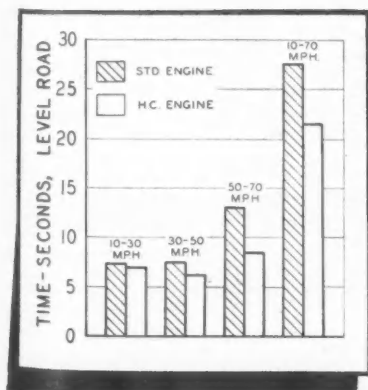
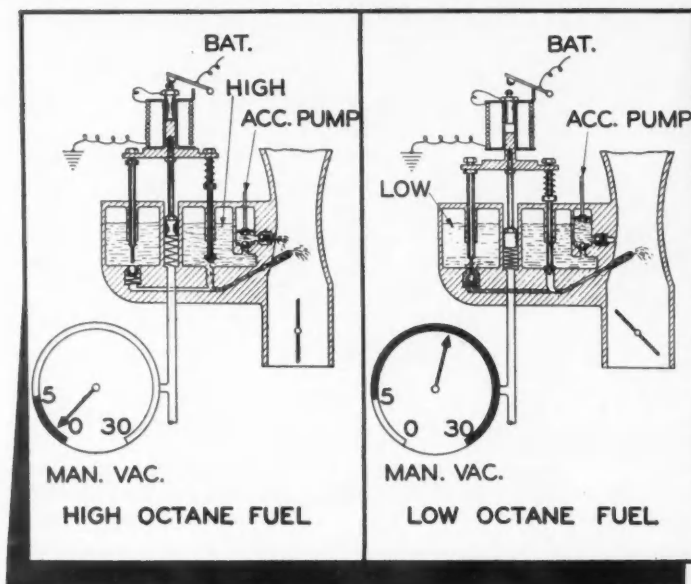


Fig. 4—Comparative acceleration time for Chevrolet stock engine and 9 to 1 C. R. engine cars with two-passenger load.

Fig. 5—Schematic diagram of Carter dual-fuel carburetor.



of anti-detonant fluid in the high compression car.

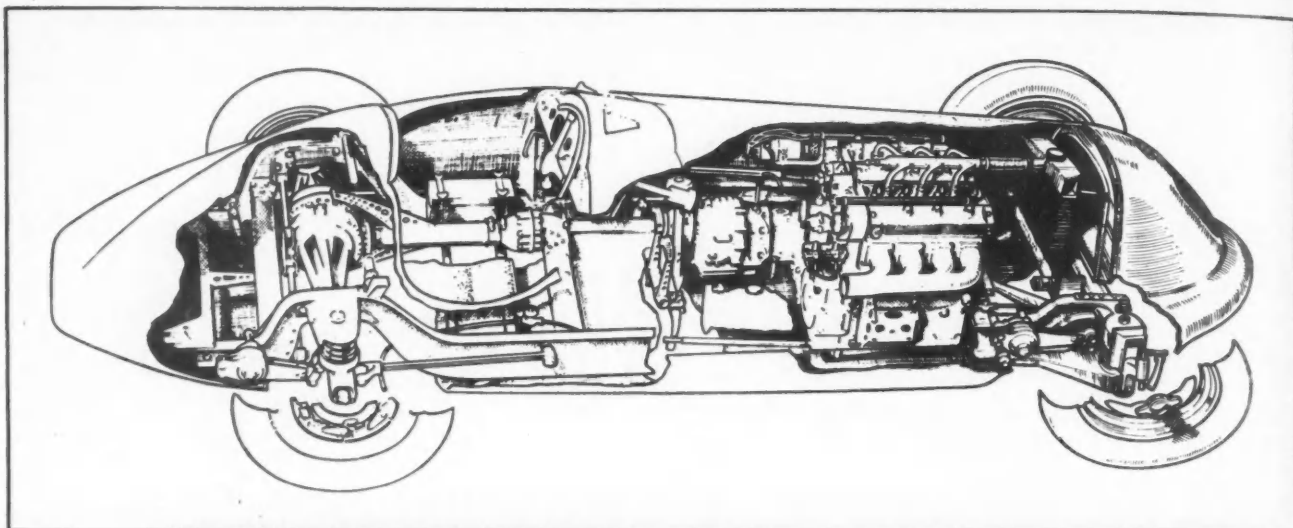
Since testing of the dual-fuel system was started several months ago by Socony-Vacuum, a dual-fuel carburetor (see Fig. 5) has been developed by the Carter Carburetor Co. In the latest installation with this carburetor, which was described by W. M. Holaday, director of Socony-Vacuum Laboratories, the regular engine fuel pump supplies the low octane number fuel and an electric pump is incorporated in the system to supply the high octane number fuel.

The bowl with the low octane number fuel in Fig. 5 supplies all fuel for idle and part throttle operation until the manifold vacuum drops to a predetermined changeover setting. At this point the piston rises sufficiently to close the solenoid switch which energizes the coil and causes the plate to be drawn upward, closing the low octane bowl jet and opening the high octane bowl jet. As long as the manifold vacuum is below the changeover setting, fuel is supplied from the high octane bowl, which also supplies fuel to the accelerating pump. When the engine is stopped, the jet in the high octane bowl is opened. Hence starts are made on the high octane number gasoline.

Mr. Holaday in his paper reported data obtained from 93 test runs, including some made by General Motors Research Laboratories. He concluded that the consumption of high octane number gasoline for a significantly high manifold vacuum changeover is in the range anticipated—15 to 25 per cent, but further test work is necessary to determine the relation between manifold vacuum and the consumption of high octane number fuel under various driving conditions and also to determine the effect of vacuum changeover point on the permissible spread in octane number between two fuels.

Several automobile and oil company engineers discussed the papers. L. L. Withrow, General Motors research engineer, reported on the octane require-

(Turn to page 58, please)



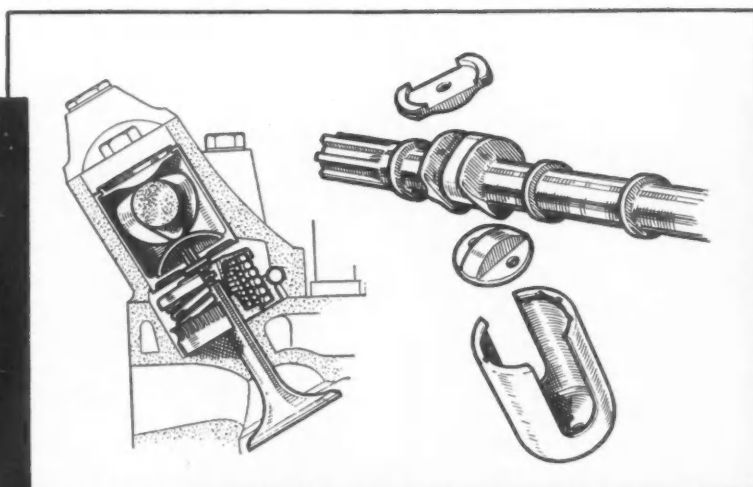
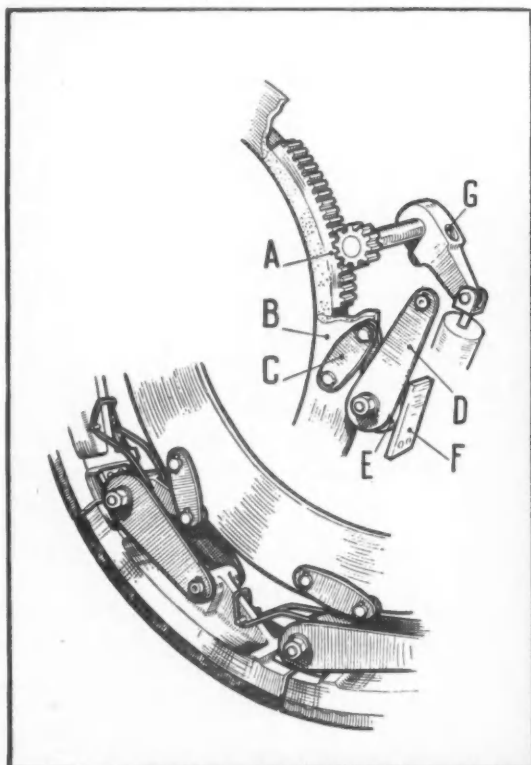
Cutaway drawing of Dommartin-Petit racer showing location of its major components.

## Twin-Four Powers

**B**UILT in France to the designs of Emile Petit, the new Dommartin-Petit racing car, which will appear in competition for the first time this year, has as its outstanding feature the use of a double-four-cylinder engine with its crankshafts ro-

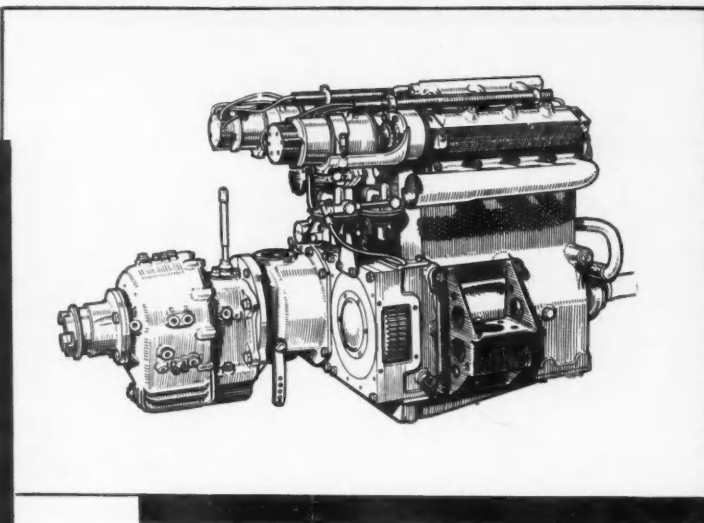
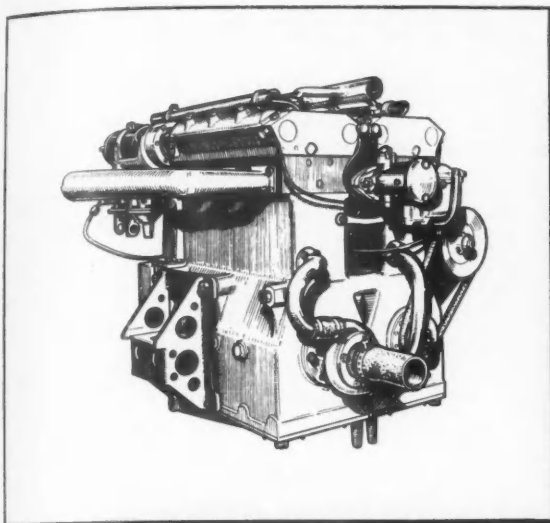
tating in opposite directions. While the bore and stroke are withheld, the piston displacement of the eight cylinders has been disclosed as 219.6 cu in. The engine is unblown and is said to peak at 8000 rpm.

The two banks of vertical cylinders are in one casting with the crankcase. The heads are detachable and there are two overhead camshafts for each bank of cylinders. The timing gear is at the rear, the housings being independent of the cylinders, so



(Above) Sectional view of positive closing valve mechanism.

(Left) A distinctive feature of the Dommartin-Petit racing car is its six-shoe brakes, details of which are shown here.



(Left) Front end of Dommartin-Petit engine. On the right side is the water pump connected to the crankshaft. The other crankshaft drives the generator.

# Dommartin-Petit Racer

**French Creation Is Equipped with 220 Cu In. Engine, Positive Valve Closing Mechanism, Electro-Magnetic Transmission Offset with Drive Shaft, and Six-Shoe Brakes**

**By W. F. Bradley**

**Special European Correspondent of  
AUTOMOTIVE INDUSTRIES**

that they can be de-mounted separately, or the valve gear and the heads can be taken off without interfering with the timing gear. The two roller-bearing mounted crankshafts are connected by spur gearing. An aluminum cradle at the top of each timing gear housing receives a Vertex magneto driven from the camshaft through a flexible coupling. The gasoline pumps are immediately below the magnetos. On the forward end of the star-board block there is a water pump with a double outlet—one to each bank of cylinders. The port crankshaft carries a pulley for belt drive to the generator. There are two carbureters, one at the front and one at the rear, with a common intake manifold between the banks of cylinders. The exhaust manifolds are on the outside.

One of the features of the engine is the positive cam closing of the valves to secure correct seating at high revolutions. The mechanism consists of a valve-opening cam with a pair of auxiliary cams each side of it, assuring the return of the valve. The cams operate in a double-ended piston guided in the camshaft housing. As the cams operate in the axis of the valves, there is no side thrust. Adjustment between the piston-type tappet and the valve stem is by means of disks between the base of the tappet and the head of the valve stem. While positively returned, the final seating and the necessary degree of

(Above) Dommartin-Petit engine consisting of two four-cylinder units with Cotal electro-magnetic transmission driven off left unit. Each magneto is driven by overhead camshaft through a flexible coupling.

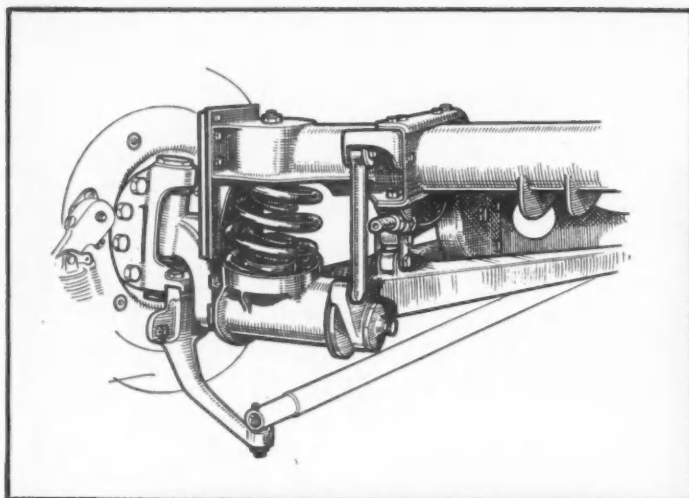
flexibility are assured by means of a light coil spring. A slow rotation is given to the valves and the operating gear in order

to assure an equality of temperature of valves and seats.

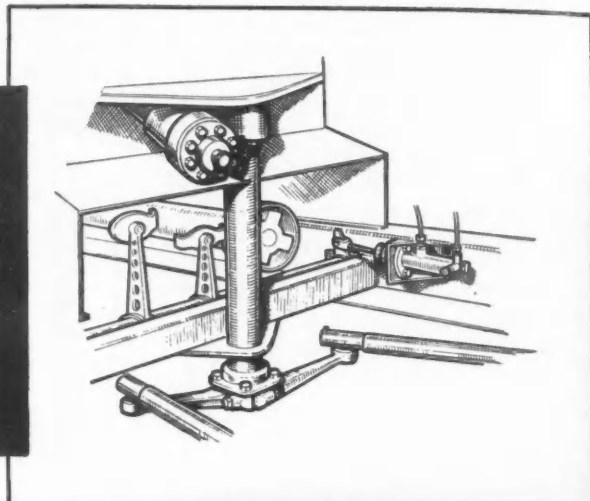
The Cotal four-speed electro-magnetic transmission is driven off the port crankshaft and is cooled by a circulation of air. The lever shown in the illustration is for reverse only, all forward changes being made by steering wheel control. This offset position of the transmission and of the drive shaft provides for low seating of the driver to the right of the shaft.

The brakes are a distinctive feature in that they consist of six shoes each occupying 60 degrees of the circumference of the drum. The illustration shows a disk B on which is mounted a ring gear A operated by a hydraulic cylinder and suitable linkage. At the end of each shoe there is a plate F, riveted to the shoe, and overlapping its extremity, so that the free end of each shoe rests on the plate of the following shoe. On rotation of the ring gear A, all the cams (E) are given the same angular movement and move the shoes towards the periphery by pressure on the plates F. The movement being radial, perfect concentricity is assured and the brake reaction is as-





(Above) Independent front suspension is of simple, rugged design.



(Right) Steering column is shortened by using a vertical shaft and long drag links.

sured on the fixed points through the links D. It is claimed that there is no tendency towards deformation of the drums and that the brakes maintain their efficiency under strenuous racing conditions.

The front wheels are independently sprung with coil springs. While the stub axle is of the normal type, the steering pivot has a vertical movement in a slide which is an integral part of the tubular cross frame member. The lower arm is a box-section member, pivoted to a cross frame member just ahead of the engine. The forward end of the arm carries a damper and is connected by a link to the fixed cross member. The coil spring is mounted in cups between the pivoting arm and the fixed cross frame member. Tread and wheelbase do not vary.

Steering is by screw and sector on a vertical column mounted on the bulkhead behind the engine.

At the base of the steering column is a lever forming a V open at the rear, and each of these arms is connected up to the two steering pivots by a rod with a ball and socket connection at each end. There is no transverse tie rod.

With a rigid rear axle, use is made of a torque tube anchored at its forward end to the main tubular cross frame member. Radius rods are fitted from the outer ends of the axle housing to the side rails and use is also made of a transverse stabilizer. Suspension is assured by vertical coil springs.

The single seater body is built entirely of Duralinox and completely encloses the driver. No attempt is made to encase the wheels. It is expected that the Dommartin-Petit racing car will take part in all the leading European races of the present season.

## Problems Facing Designers of British Racing Car

**W**HEN the British racing car appears its engine will be capable of 14,000 rpm and of holding 11,000 rpm for long periods, according to Raymond Mays, who is associated with designer Peter Berthon in Automobile Developments Ltd.

The B.R.M. car will have a 91.5 cu in. 16-cyl V-type supercharged engine with a stroke slightly shorter than the bore. It is understood that it will have a normal type transmission, rear wheel drive, and independent suspension in front. As construction is in the initial stages, all details are being withheld. According to the present program, the first en-

gine should undergo bench tests in September and three cars ought to be ready for action by the end of next year.

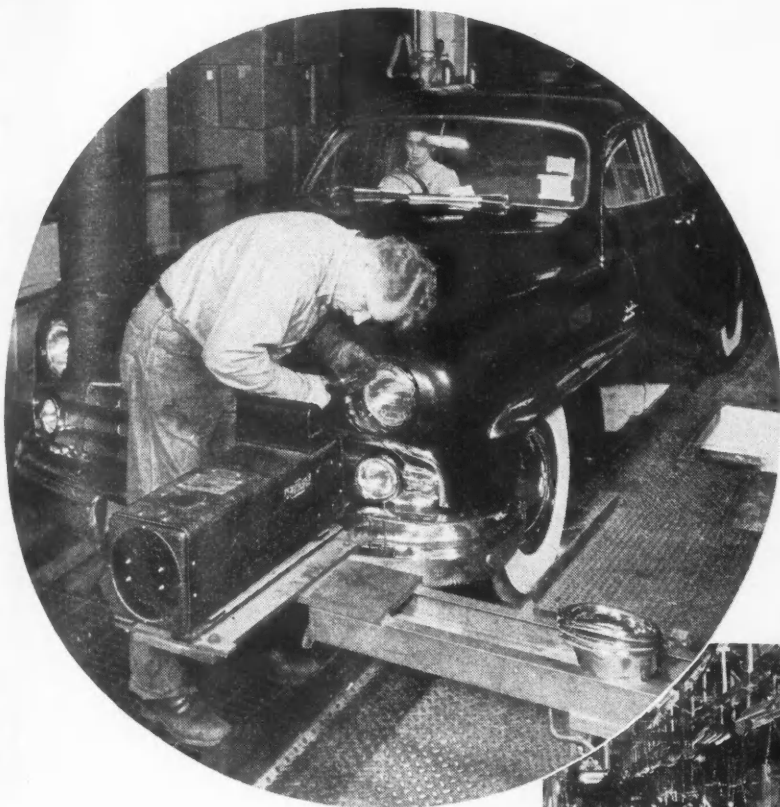
After considerable difficulties Raymond Mays and his associates have succeeded in interesting the British Government in his scheme to provide a national racing team which will be of technical, economic and propaganda value. So far this support is limited to granting priorities for securing material and carrying out work. No monetary assistance has been given or promised.

All financial support comes from different British automobile and ac-

cessory manufacturers who have undertaken to do work free of charge and in some cases to contribute money, which is handled by the British Motor Racing Research Trust and distributed by them to the manufacturing body, Automobile Developments. With the exception of the Standard Motor Co. and Rolls Royce, other British automobile manufacturers appear to have kept out of the scheme. Automotive equipment firms, however, are very strongly represented.

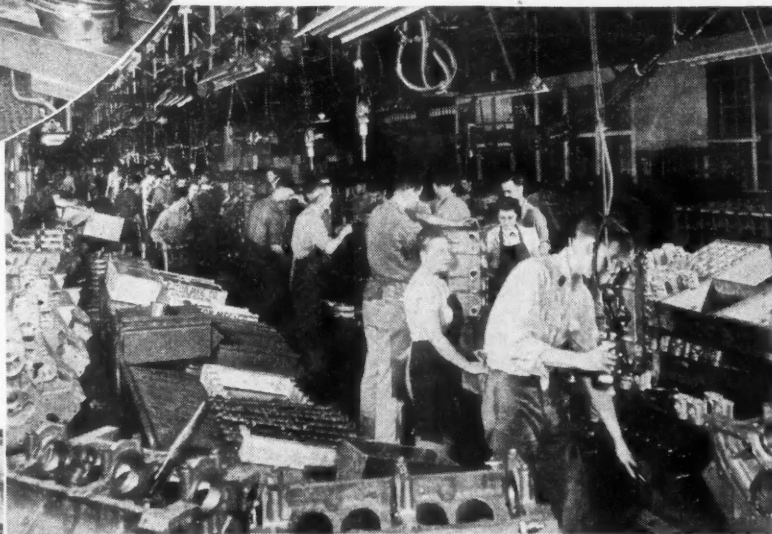
Rolls Royce has undertaken to develop superchargers for the racing  
(Turn to page 74, please)

## Assembly and Testing at the Lincoln Plant

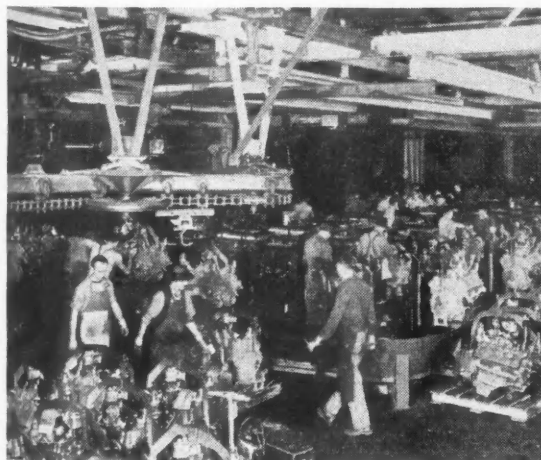


(Circle) Latest wrinkle on the Lincoln final assembly line is the adoption of Weaver electronic equipment for headlamp adjustment and Bean equipment for front wheel alignment. Wheel alignment is made with the car over the pit—as shown—the front wheels being rotated at high speed during the operation so that adjustments will represent true road conditions.

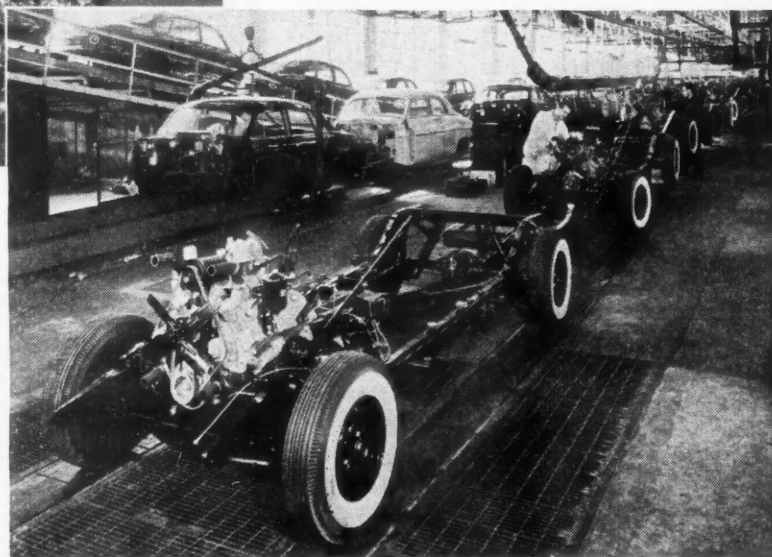
(Below) Here is the centralized battery of newly developed engine block testing units. This handles the initial run-in of new Lincoln passenger car and truck V-8's.

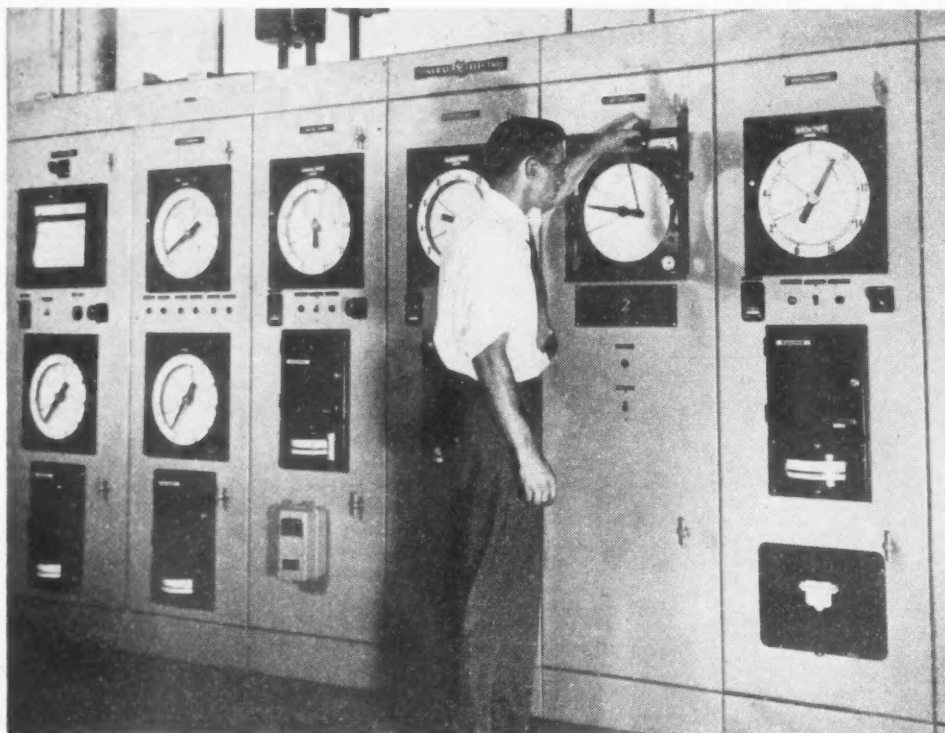


(Above) A portion of the busy Lincoln engine assembly line is seen here, the operation beginning with receipt of cylinder blocks at the right hand corner.



(Right) Perspective shot of the new final assembly line at Lincoln. Chassis assembly shown here progresses into the foreground where bodies are installed and the assembly completed. Bodies for the final line may be seen in the background, moving down the ramp from the second floor. The body on floor level at the left is ready to move to the body drop.





# The V Heat T

**Fig. 1 — Instrument panel for pit carburizing furnace, brazing furnace, tempering furnace, and two salt baths.**

**T**HE heat treating aspect of metallurgy plays a vital role in both the development and production of Mack trucks, buses, fire apparatus, and marine engines.

In the fabrication of experimental engines and other components, and in their subsequent production, proper heat treatment is a determining factor in obtaining top results. Of major importance in heat treating operations in the Research Division of the Mack Manufacturing Corp. is the proper measurement and control of temperature, with well planned instrumentation measuring and controls in the various heat-treating furnaces and salt baths.

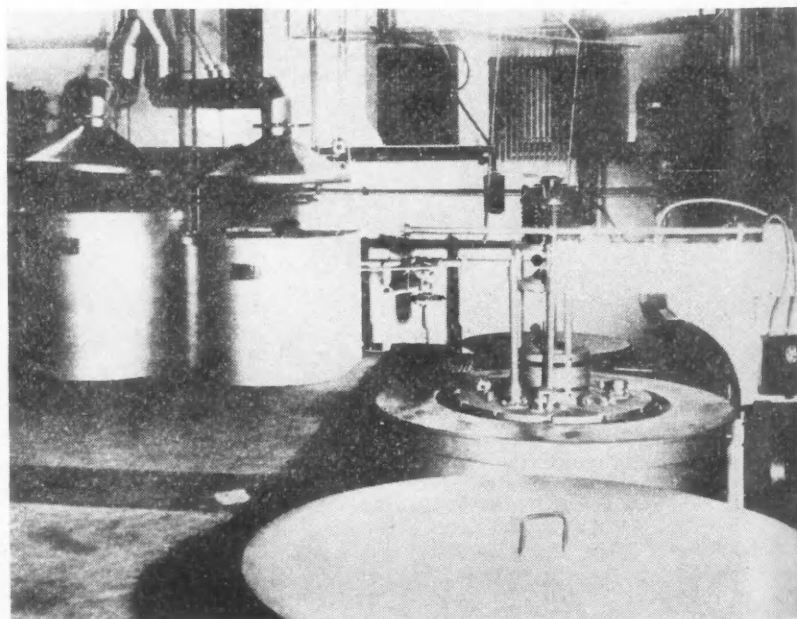
## NATURE OF WORK PERFORMED

Heat-treating work in the Research Division falls into three categories.

1. Heat treatment of samples and specimens, conducted in conjunction with metallurgical tests on various metals; 2. The actual heat treating of parts for experimental engines and other assemblies built by the Research Division; 3. Pilot plant heat treatments are carried out and, from the data obtained, a proper time-temperature program and the precise procedure for final use is worked out

and the resulting information turned over to the production department.

In a heat treating department which must carry out these functions, flexibility of furnace operation and of temperature measurement and control is of paramount importance. This flexibility is attained, basically, through the specially designed and wired instrument panel shown in Fig. 1. From this panel, the temperatures of five heat-treating appliances are controlled and recorded. In addition, provisions are made for switching two of the control instruments to external connections so that they may be used in conjunction with auxiliary devices for special work.



**Fig. 2 — View of the pit carburizer (foreground) and two salt baths. The salt bath in the left background is electrically heated, the one on its right is gas fired.**



By C. C. Roberts

Technical Section, Brown Instrument  
Co., Division of Minneapolis-Honeywell  
Regulator Co.

# e Vital Role of t Treating Research

## Mack Relies on It in Development and Production of Vehicles and Engines

Provisions for a sixth permanently installed heat treating device are included by an additional panel space.

### HEAT TREATING EQUIPMENT USED

The five permanently installed heat-treating appliances comprise: a carburizing furnace, a brazing furnace, a tempering furnace, and two salt baths. All are electrically heated with the exception of one salt bath which is gas-fired.

Electric power to the furnaces is supplied through the instrument board. A transfer switch provides a means of switching the pyrometer control circuit from company-generated power to public power, or vice versa, a provision made necessary to enable automatic temperature records of cooling curves and various other operations over weekends when the company power plant is shut down. It is also a means for rapidly switching to stand-by power in the event of power failure.

An electric timer is mounted at the lower center of the instrument board. By means of a selector switch, mounted on the control panel of each of the heat treating units, this timer can be connected into a potentiometer circuit, and the starting and stopping time of operations can be automatically controlled.

The switches may be set to give automatically timed operation for either an individual unit or for all units simultaneously. In this way, the automatic performance of one heat-treating operation can be carried out while other units are being used for other tasks.

### PRECISE AND FLEXIBLE INSTRUMENTS AND CONTROL

The Brown electronic strip chart instrument seen at the upper left section of the instrument board

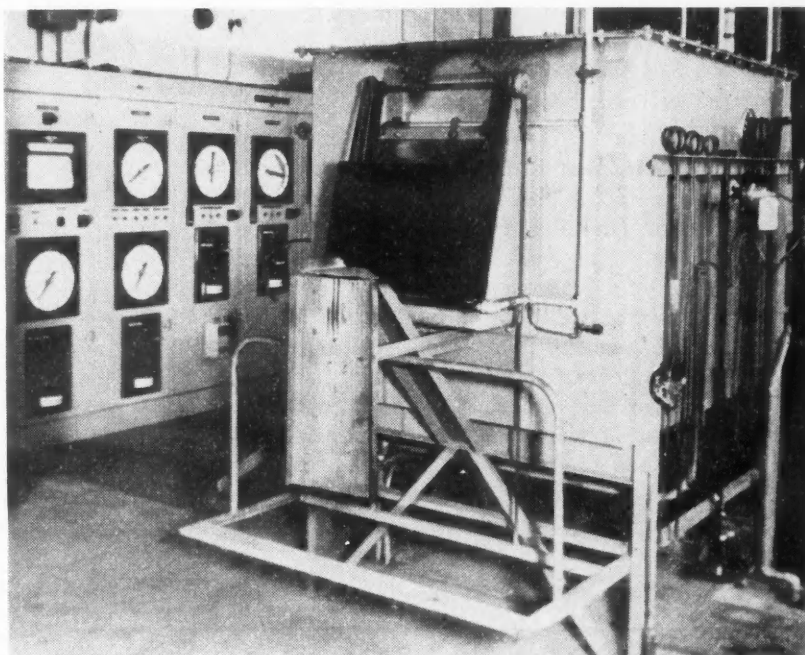


Fig. 3—Box-type brazing furnace with instrument panel in background.

(Fig. 1) is used with all heat-treating units when an accurate record of the furnace-load temperature is required. By means of a switch, located just under this instrument, it can be connected to thermocouple terminal boxes located at five points within the heat-treating room.

The terminal box, in turn, is attached directly to the furnace load by means of an exploratory thermocouple, the cold junction of which is connected to the terminals while the hot junction is attached to the work in the furnace.

The strip chart unit can also be operated as a recording controller by the use of a microswitch and cam arrangement which, attached to the shaft, drives the temperature indicating pointer; it may

(Turn to page 70, Please)

# The Comets

**Three Diesel Truck Models Designed for Export Markets Now Being Produced by Leyland Motors Ltd. England. Gross Vehicle Weights Range from 20,700 to 34,700 Lb.**



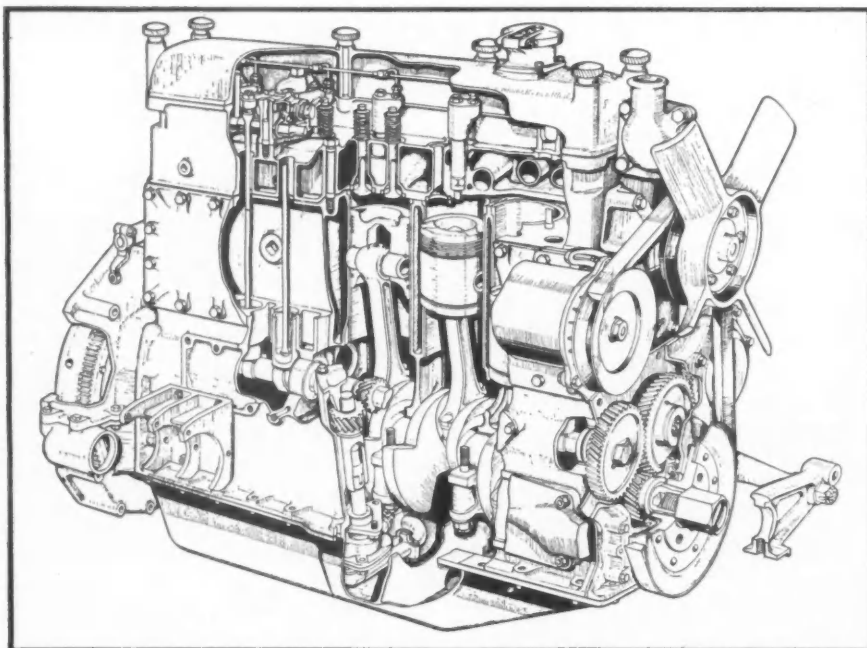
*Styling of the Leyland Comet driver's cab has been done with an eye on American markets, as shown by this front view. The design provides cab comfort for driver and passenger, as well as accessibility to the engine through the rear-hinged hood.*

**L** EYLAND Motors, Ltd., Lancashire, England, has designed and is now producing an entirely new series of Diesel-engined trucks known as the Comet models. The vehicles are essentially export models designed specifically to compete in the world markets. Designs are also completed for a Leyland Comet export passenger-bus chassis, production of which is scheduled to commence in the first half of 1948. All these new models are distinguished by a modern frontal appearance. The conventional Leyland radiator has been replaced by a concealed radiator, masked by a sweeping pressed steel front and a one-piece hood hinged at the rear.

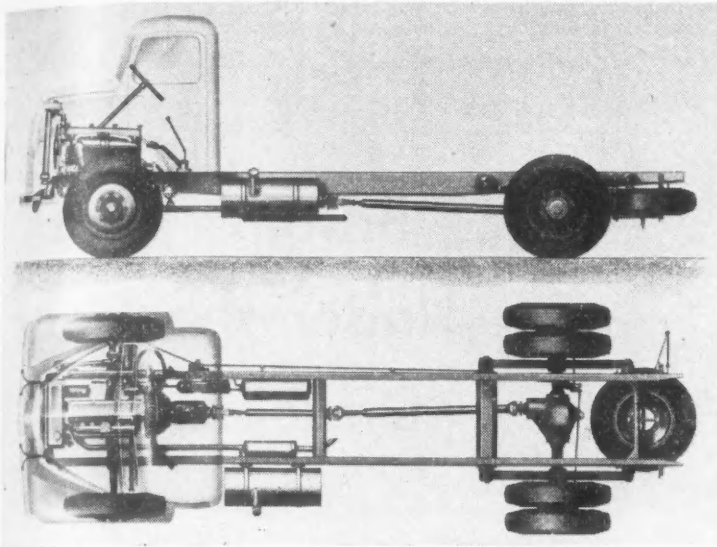
The commercial line consists of freight, dump and tractor models, all of which are powered by a new high-efficiency 75 hp Diesel engine which transmits its power through a five-speed transmission and a hypoid bevel rear axle. The gross ratings of the trucks on 9.00 by 20 in. tires are 21200 lb for the freight and dump models, and 34700 lb for the tractor model. Other specifications are shown in the accompanying table.

The bus chassis, which will have the same frontal appearance as the trucks with similar transmission will have a wheelbase of 210 in. and will be suitable for a 32-35 seat body. It will have the same engine, and axle units as the truck chassis, but with slight modifications. All models have semi-forward controls as this design gives the best compromise on medium-weight vehicles between body length, weight distribution, engine accessibility, visibility, and cab comfort, particularly in tropical conditions. Left or right hand steering and controls can be supplied for all chassis.

Comet trucks can be supplied on three different wheelbases: the freight model, ECO.1 with a



*(Left) Cut-away drawing of the new Leyland 75-hp Diesel engine. The cylinder block and crankcase form a single iron casting. Seven thin-shell indium-coated copper-lead bearings carry the nitrided alloy-steel forged crankshaft. The camshaft is housed in the right-hand side of the crankcase casting and is driven by helical-toothed gears from the front end of the crankshaft.*

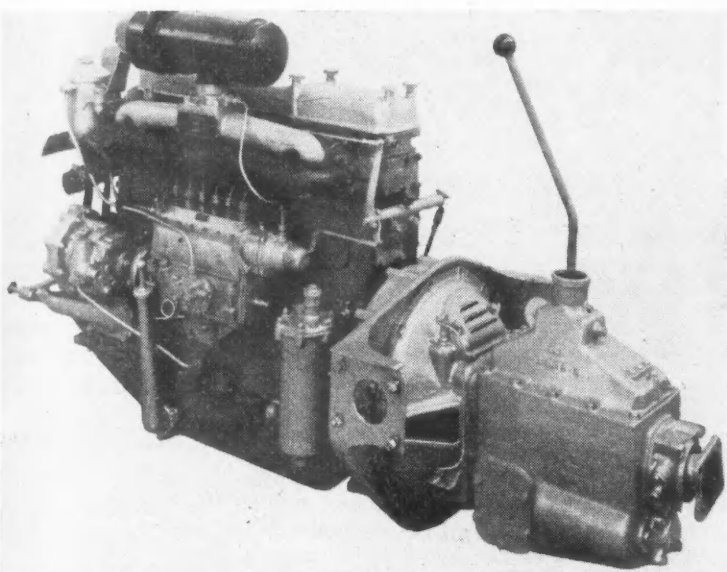


Elevation and plan view of the right-hand drive Leyland Comet ECO.1R, the long wheelbase truck chassis.

# PRINCIPAL WEIGHTS AND DIMENSIONS OF LEYLAND COMET MODELS (WITH 9.00 BY 20.00 IN. TIRES)

Model	Freight ECO/1R- ECO/1L	Dump ECO/2R- ECO/3R	Tractor ECO/3R- ECO/3L
Gross Rating (lb) ...	20700	20700	34700
Weight of Chassis Cab* (approx-lb) ..	6720	6620	6520
Wheelbase (in.) .....	170	125	110
Overall Length (including body-in.)	268	215	...
Overall Length (chas- sis and cab-in.) ...	258	201	186
Length of Frame be- hind Cab (in.) .....	176	119	104
Body Length (in.) ..	186	126	...
Overall Width (in.) ..	90	90	90
Platform Height (laden-in.) .....	44	49	..
Turning Circle (approx.-ft) .....	60	45	40

\* Weight of chassis and cab includes batteries and front fenders, but not oil, fuel, water and spare wheel.



Leyland Model 0/300 six-cylinder direct-injection Diesel engine, built as a unit with the clutch and five-speed transmission. The radiator is mounted on the engine on the two front support arms. Developing 75 bhp at 2000 rpm, this engine has a torque of 220 lb-ft at 1100 rpm, and a specific fuel consumption of 0.048 gal per bhp per hr. It is provided with removable cylinder liners, push-rod operated over-head valves, and a filtered pressure lubrication system.

wheelbase of 170 in. giving a platform length of 186 in.; the ECO.2, a dump truck suitable for a five cu yd tipping body on a wheelbase of 125 in.; and the ECO.3 with a wheelbase of 110 in. for use with a semi-articulated trailer, either of the permanently mounted or quickly detachable type.

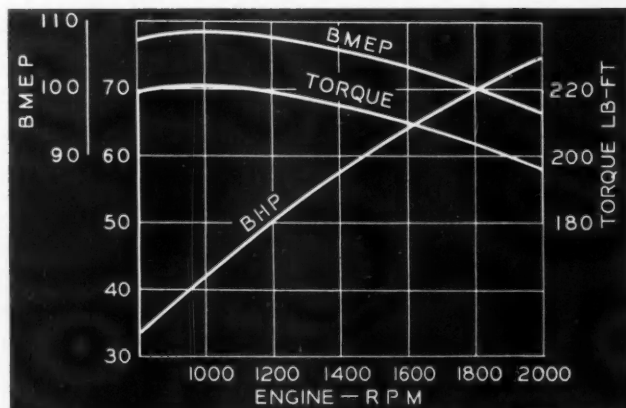
For those operators who prefer a gasoline engine, Leyland has a six-cylinder gasoline engine of the same capacity as the Diesel. The gasoline until will develop 100 bhp at 2400 rpm and will be interchangeable with the Diesel engine on both commercial and passenger vehicles.

The six-cylinder direct-injection Diesel engine which is a standard power unit for Comet models is a small edition of the 598 cu. in. Leyland Diesel en-

gine. Like this unit, the new engine has maintenance-saving features such as dry-type cylinder liners which are a push-fit in the cylinder block and can be removed or replaced by hand pressure without removing the engine from the chassis frame.

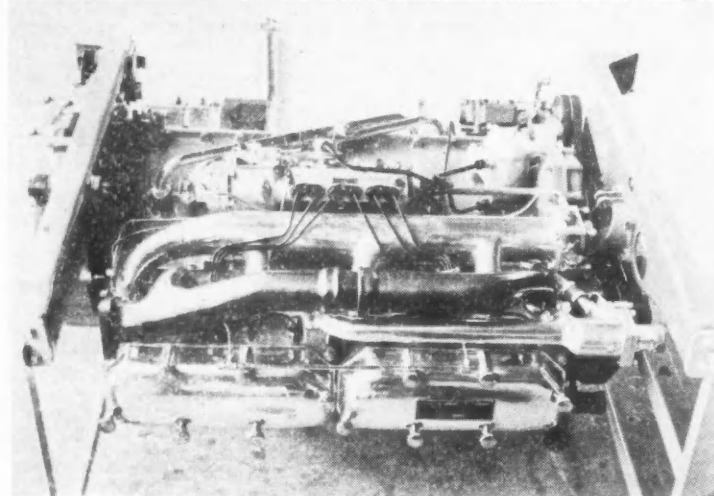
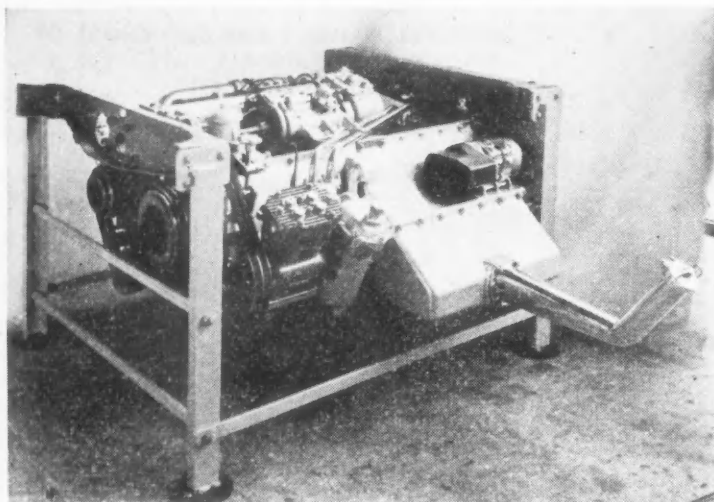
The six-cylinder Comet Diesel engine has a bore and stroke of 3.8 in. by 4.5 in., a displacement of 306 cu in., and develops 75 hp at 2000 rpm. Compression ratio is 16, maximum torque 220 lb-ft at 1100 rpm and minimum specific fuel consumption of 0.0481 gal per hp per hr. Use is made of a single cast-iron head, with stellite faced inlet and exhaust valve seats and rolled threads for the studs.

The crankshaft is an alloy steel forging hardened by the nitriding process and is carried in seven thin-shell indium-coated copper lead bearings. The seven journals are 2.9 in. diam and the crankpins 2.4 in. diam. A rubber-bonded vibration damper is (Turn to page 60, please)



Performance curves of the new Leyland six-cylinder Diesel engine, showing bhp, torque and bmep.





**Fig. 1 (Top) Left side view of Leyland flat Diesel engine showing the arrangement of accessories and the long oil filler pipe.**

**Fig. 2 Right side view of Leyland Diesel engine. No units which require frequent servicing are located on this side of the power plant.**

**T**O MEET foreign requirements, the first British under-the-floor Diesel engine has been produced by the Leyland Co. and deliveries are being made for bus service in Oslo, Norway. This type of engine is not yet in use in England.

The Leyland horizontal is a development of the firm's 0/600 model, the six cylinders having a piston displacement of 597 cu in. bore and stroke being 4.8 by 5.5 in. The total height of the engine is just under 24 in. This reduced height has been secured by a rearrangement of the auxiliaries. The oil sump has been modified and is filled through a long pipe which extends just outside the frame side rail. The water circulating system has been modified to prevent the formation of steam pockets. There are drainage pipes on the return side of the lubrication system and a new three-point flexible engine mounting has been adopted.

Under the new layout, the units which are likely to require attention are on the top and left side of

## Britain's First Under the Floor Diesel Engine

**By W. F. Bradley**

**European Correspondent for  
Automotive Industries**

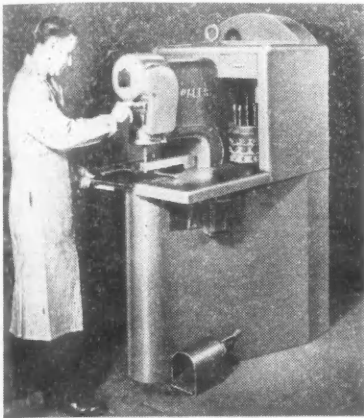
the engine. The C.A.V. fuel pump, working in conjunction with the Leyland mechanical and vacuum-operated governor, is mounted on the top of the engine. A felt-and-cloth-bag fuel oil filter is mounted slightly forward of and adjacent to the pump drive.

A belt-driven air compressor is carried on the left side of the engine, just ahead of the oil sump. To the right of it is the full-flow, cloth-element lubricating oil filter, and farther to the right, on the top of the crank case, the electric starting motor.

Power output of the Leyland is 125 bhp at the maximum governed speed of 1800 rpm, and the maximum torque is 410 lb-ft at 900 rpm. Weight of the power plant, less generator and starting motor, is 1630 lb. The three-point flexible mounting of the engine is a variation of the standard Leyland system. At the rear are two link shackles fitted with Harris bushings, while at the front a single rubber-bonded mounting is used. The mounting in the frame gives a tilt of 3 deg from the horizontal to assist oil drainage.

## M-1—Sheet Metal Fabricator

A new sheet metal fabricator manufactured by the Wales-Strippit Corp., North Tonawanda, N. Y., performs punching, notching, nibbling, bending, forming and blanking in a "quick change" system. Wales self-contained units form the nucleus of this fabricator. A self-contained holder is slidable on ways in the press bed. Various round and shaped punches and dies are said to be instantly interchangeable in this holder. Three dies of various clearances are pro-



Wales sheet metal fabricator

vided for each punch to accommodate material up to 3/16 in. thickness. All burring operations are said to be eliminated.

The fabricator is specially designed with a 5-13/32 in. opening under the ram. Nibbling around guide plates is said to be practically an automatic operation by positioning the nibble lever to provide continuous, uninterrupted operation of the ram. An extended adjustable holder with a man-



For additional information regarding any of these items, please use coupon on page 56

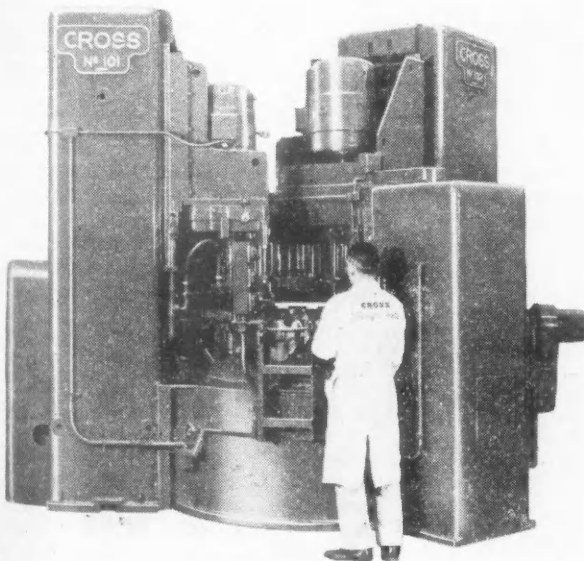
ual turning device permits the work to swing at the center point for nibbling out full circles, semi-circles and arcs.

A feature of the fabricator is the Hydra-New-Matic head which operates with a minimum of vibration and noise at 165 strokes per minute for single hole punching and nibbling. An anti-jam device in the head is released by backing off a screw to relieve the oil pressure.

## M-2—Special Drilling and Tapping Machine

A special drilling and tapping machine, which greatly facilitates production of automobile rear axle differential carriers, has been designed and built by the Cross Co., Detroit, Mich.

A seven station machine, its drills, countersinks, and reams 10 flange holes; drills, countersinks, and taps 4 bearing cap holes; drills and taps the drain hole. It completes 150 differential carriers per hour at 80 per cent efficiency. Only one operator is required and, it is claimed, he needs less skill than formerly, since



Cross special drilling and tapping machine

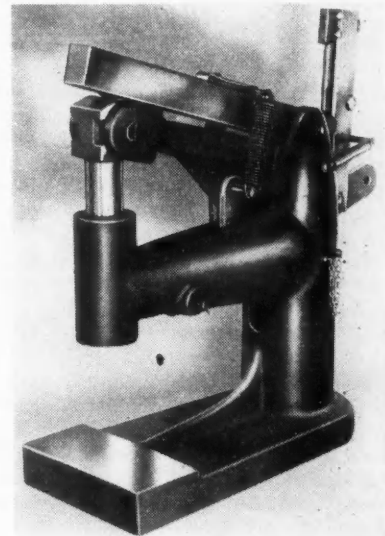
functioning of the machine entails a minimum of physical and mental effort on his part. When the operator pushes a control button the power operated index table takes over. Six pieces are cut at a time progressively. No lifting is required since the parts slide in and out of the machine on rails.

The machine is sufficiently flexible to permit reasonable changes in product design. Maintenance has been simplified through the use of standard and interchangeable Cross units.

Other features include hardened and ground steel ways, hydraulic feed for drilling, reaming, and countersinking, and lead screw feed for tapping.

## M-3—Automatic Staking Machine

The High Speed Hammer Co., Inc., Rochester, N. Y., is now manufacturing an automatic staking machine in four models expressly designed for staking or riveting fixed or movable joints. It is said to be equally adapted for such operations as eyeletting,



Automatic staking machine of the High Speed Hammer Co.

inserting grommets, burring, and pointing with platinum, tungsten or silver. The action of the hammer blow is absolutely uniform, assuring interchangeability of assembly parts, and provides for the same blow on the piece regardless of any slight variations in the thickness of parts being staked or riveted.

All four size models are available in either manual or motor driven types, leaving both hands of the operator free for the most efficient work. It is said to be impossible to trip the hammer with fingers in the die. Inexperienced operators, it is claimed, can produce in excess of 1000 pieces per hour with these automatic staking machines.

## M-4—New Hydrostatic Tube Tester

A recent development of the R. D. Wood Co., Phila., Pa., is a new hydrostatic tube tester. The tester is designed to test tubes with diameters from  $\frac{3}{4}$  inch to  $3\frac{1}{2}$  inches nominal outside diameters, and from 10 ft-0 in. to 26 ft-0 in. in length, at pressures selected and preset from 750 lb to 3000 lb. The testing of the tubes is conducted with a fluid, usually water, under hydraulic pressure. Average tubes of  $3\frac{1}{2}$ -in. diameter and 26 ft in length can be tested in a claimed 45 seconds—or at a rate of 80 an hour.

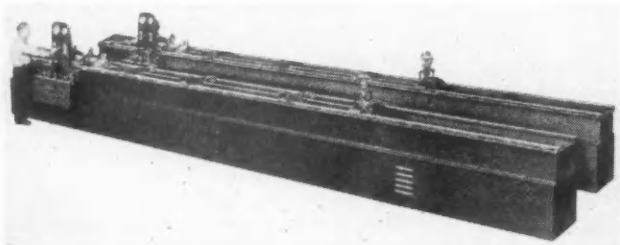
The machine is essentially a long flat steel bench with steel tension bars along the top of both long sides. These tension bars are drilled so that guides and head can be moved in 6-inch increments to permit the testing of tubes from 10 feet to 26 feet. The tube to be tested is held between two ends or heads, which also seal the tube. The resistance head may be adjusted by means of the drilled holes in the tension bars, while the other head is movable and applies the pressure to the tube. The movable head is arranged for a 12-inch maximum stroke or an 8-inch minimum stroke. A high pressure oil hydraulic operating cylinder delivers the thrust on the movable head and the fluid is also introduced into the tube through a passage in the cylinder. Three clamping carriages spaced between the two heads clamp automatically to hold the tube securely.

In the testing cycle, the tube is first clamped by the air-operated clamping carriages. The movable head moves forward and the tube is forced into the sealing assembly in the movable head. Continued motion forces the tube back until it is sealed in the resistance post assembly. The test pressure is then applied. When the test is completed the cycle is reversed and the tube is ejected by the clamping carriages.

The entire operation may be controlled by one man from a control panel.

## M-5—Conical Involute Cutter

The National Broach and Machine Co., Detroit, Mich., has developed a



Hydrostatic tube tester of the R. D. Wood Co.

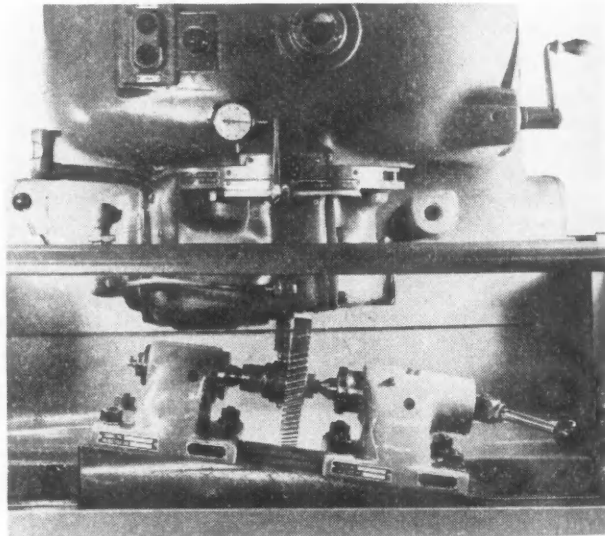


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conical involute cutter for shaving close shoulder gears. The new method is said to overcome the difficulty of shaving shoulder gears by the rotary cross axle principle with conventional cutters in which the difficulty varies inversely with the amount of clearance available. In conventional cutting, with very small clearances, the angle between the axes of cutter and work gear may become so restricted that cutting action is seriously reduced.

In using the involute cutter and

National Broach and Machine Co.'s conical involute cutter



tipping the work away from it, sufficient angle is allowed between the axes of cutter and work gear to attain excellent cutting action. This new method is applicable to shaving

spur and helical gears or teeth which are tapered away from or toward the shoulder gear, such as clutch gears in automotive transmissions.

## M-6—Six Station Drill Press Turret

An automatically aligning drill press turret has been released for sale by Howe & Fant, Inc., South Norwalk, Conn. Trademarked Lign-o-matic, this turret is so constructed that its six spindles are automatically centered and aligned by the drill press spindle.

The six Lign-o-matic spindles are mounted on floating bearings so that they are free to move laterally and angularly as well as to rotate. As the tapered driving unit, attached to the drill press spindle, engages the mating taper of a Lign-o-matic spindle, it centers and aligns the Lign-o-matic spindle and locks it in that position until the drilling operation is completed.

Driving power is transmitted directly from machine spindle to the Lign-o-matic spindle by the same tapered surfaces that accomplish alignment. These mating tapers are SAE

4615. They will turn a  $\frac{1}{2}$ -in. drill through hard material without a lead hole and yet are said to easily disengage for indexing without stopping the motor. Tool changes are made by raising the drill press lever and indexing the turret to another station.

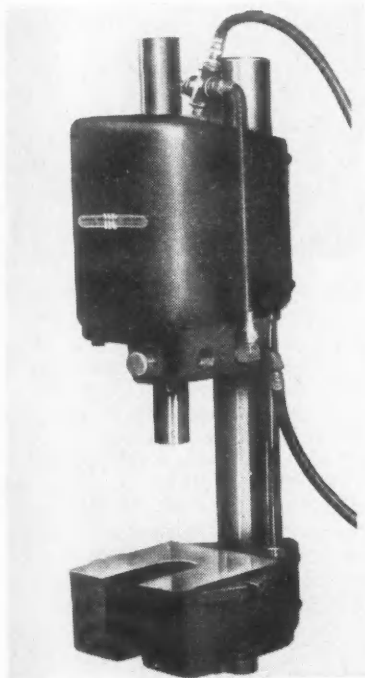
## M-7—Bench Type Production Hammer

Bryant Products Distributing Co., Jackson, Mich., offers a bench type production hammer that is adjustable from one oz to 12,000 lb impact with 100 psi air line pressure. In



this new hammer, air under high compression is equalized on both sides of the piston. When the air below the piston is then exhausted suddenly, the resulting blow is said to be remarkable in a press of this size.

Suitable for light stamping and forging, trimming, molding, crimping, coining, riveting, piercing, staking and forming in various materials, the



**Bryant bench type production hammer**

hammer will do production work on up to 1/4 in. mild steel rivets, according to Bryant.

The hammer's operation is opposite to that of the mechanical press. In the latter, stroke is set to fit the job, impact varies only with the press capacity. In the Bryant press, stroke is constant, impact pressure may be varied up to the press capacity. Impact pressure then remains the same at any point along the stroke. The cushion of air behind the hammer takes up shock, the stroke then accommodates to offsize work pieces.

## M-8—Portable Oil Flusher

Internal cleaning of machinery without disassembling is said to be possible through the Lubey portable oil flusher manufactured by the Fox River Tool Co., Menasha, Wis.

By means of a high pressure nozzle jet, organic solvents, kerosene or lubricating oil can be shot through the inspection or clean-out openings of housings around bearings, gears or cranks. Thus it is possible to loosen dirt, sludge or wear particles, or force out water. Through a safety

# NEW Production and Plant EQUIPMENT

for additional information regarding any of these items, please use coupon on page 56.

control device, the flow may be reduced to a gentle flushing stream if desired.

The residue may be drawn out through drain connections, or by a suction hose, and collected in a filter. The flushing solvent is thus cleansed, and may be recirculated through the machine until the parts are clean.

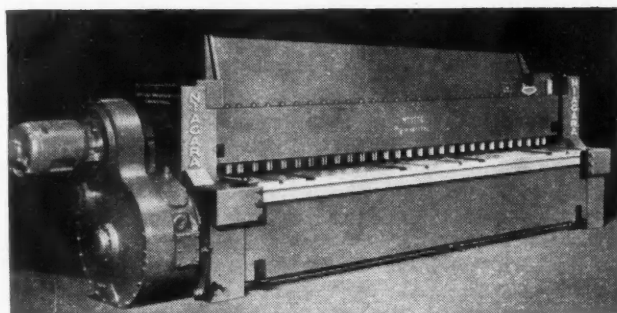
The unit consists of a tank for holding and carrying the flushing fluid to and from the machine to be cleaned; a pump and driver for actuating the fluid; a filter for collecting the refuse cleaned out; and hoses, piping, valves and safety pressure control.

## M-9—Heavy Duty Squaring Shears

A new addition to the line of heavy duty, underneath drive squaring shears made by the Niagara Machine and Tool Works, Buffalo 11, N. Y., is the No. 1214 with a rated capacity of 5/8 in. mild steel 14 ft long. It has a rectangular box section bed and triangular box section cross head to give rigid support to the knives. This rigidity, together with the low slope of the upper knife, is said to greatly reduce the tendency for the sheared pieces to twist, curl or camber.

The holddown, driven by eccentrics on the crankshaft, needs no auxiliary operating mechanism. Its self-contained, individually spring-loaded feet clamp the metal during the working

**Niagara squaring shears**

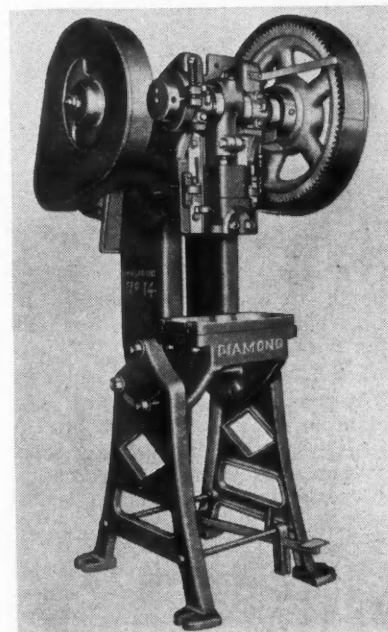


part of the cycle and automatically compensate for variation in metal thickness.

All rotating parts, including the Niagara 14-point engagement sleeve clutch, heat treated gearing and the connections, are totally enclosed and operate in a bath of oil.

The parallel ball-bearing, self-measuring back gage can be arranged for either manual or electric operation. When motor driven, it is equipped with a direct reading indicator located in the crosshead. The "wide" and "narrow" push buttons are located on the frame.

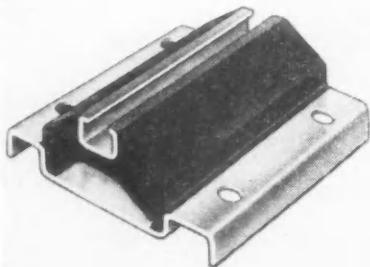
## M-10—Open Back Geared Punch Press



Claimed to be one of the smallest back geared presses on the market, this 14-ton open-back inclinable geared punch press is manufactured by the Diamond Machine Tool Co., Los Angeles, Calif. Specifications are as follows: maximum strokes per minute, 65; standard length of stroke, 2 in.; maximum length of stroke to order, 4 in.; bed area 8 by 15 in.; shut die height on No. 14-A is 7 in. and on No. 14-B, 9 in. These presses have a non-repeat single trip mechanism.

## P-1—New Type Machine Mounts

The Lord Manufacturing Co., Erie, Pa., describes its "Chan-L-Mount," one of two new products, as "packaged vibration control." It claims for this new mounting easy installation, strength, and adaptability. The mounting is 1 1/4 in. high and is installed by sliding under the ma-

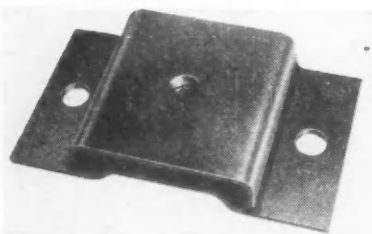


Lord "Chan-L-Mount"

chine to be mounted. A bolt head is inserted in either end of the metal channel, which holds it while the nut is tightened. The heavy cushion of soft rubber prevents metal-to-metal bottoming, under occasional shock. The manufacturer claims that a deflection of 1/4 in. enables "Chan-L-Mounts" to isolate frequencies as low as 600 cpm, in addition to all higher frequencies.

"Chan-L-Mounts" are made in a full range of sizes for small and medium weight machines. The manufacturer recommends them for such installations as pumps, air compressors, motor generators, air conditioners, etc.

The other new product, called the "Shockmount," is designed to control shock, isolate high frequency vibration, and reduce noise transmittance to the floor. This "Shockmount" is a heavy duty mounting, with load capacities up to 7500 lb per mount. The company claims this new mount reduces the need for massive founda-



Lord "Shockmount"

tions to achieve inertia, and permits the placing of heavy machines where they would otherwise be impractical; also that the noise of such machines as punch presses is greatly reduced.

The device features low, compact construction, 1 3/16 in. high. The top plate contour limits movement and sheds oil and dirt. The flexing element is oil-resistant synthetic rubber.



For additional information regarding any of these items, please use coupon on page 56

## P-2—Internal Fluted Welding Electrode

Announcement has been made by P. R. Mallory & Co., Inc., Indianapolis, Ind., of an improvement in the design of resistance welding electrodes consisting of an internal fluting in the side of the water hole. This design is claimed to provide better than 70% more water cooling



Mallory fluted welding electrode

area, to materially increase the strength and rigidity of the electrode, and to provide automatic centering of the water cooling tube, while eliminating distortion under pressure. Shop tests have shown life increases over the conventional electrodes of as much as 30 per cent.

The Mallory fluted welding electrode can be used to replace the old conventional types.

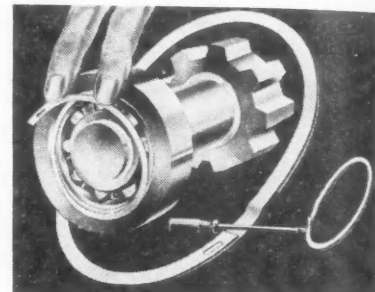
## P-3—New Gapless Retaining Rings

Savings in weight, space, parts, machining and assembly time are said to be achieved by the use of new "Spirolox" retaining rings made available by the Ramsey Corp., St. Louis, Mo. The rings, offered in all wanted sizes, are a development of the Ramco 10-Up continuous "Spiro-Seal" piston ring segment.

"Spirolox" positions and locks moving parts—pinions, bushings, bearings, etc.—on shafts and in housings, eliminating nuts, caps, machined parts, pins, keys and similar locking and positioning means. The new retaining ring is made of a flat spring steel band, wrapped twice around itself, concentric in its groove at all times, and gapless. Elimination of the gap eliminates the dynamic unbalance encountered in conventional horseshoe-shaped retainers, and provides bearing surface for thrust loads

at all points on the ring's circumference. Holding strength is equally distributed around the circumference of this ring.

It is easily adapted to fixtures for automatic production line installation. It hugs the groove, has high resistance to centrifugal force, resists winding or unwinding under thrust force, resists thrust forces up to its



"Spirolox" retaining rings manufactured by the Ramsey Corp.

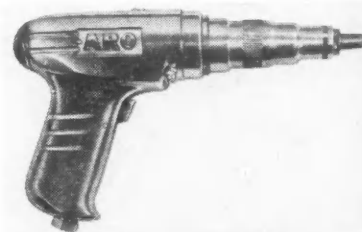
shear strength, and will not jump its groove before shearing. Two-turn coil design causes it to lock in its groove under thrust force.

No special tools are required to install "Spirolox" rings. They are spiralled to inside or outside grooves. In shop or field an ordinary screwdriver inserted in a slot in the ring slips them out. They are claimed not to distort with re-use.

## P-4—Reversible Screw Driver

A new air-powered reversible screw driver and nut setter, Model 7091, is offered by the Aro Equipment Corp., Bryan, Ohio.

The new tool has ample power and high driving torque for No. 1 to 10 machine and wood screws and 1/4 in. nuts. The low free speed of 1,000



Aro air-powered reversible screw driver

rpm (working speed approximately 750 rpm) insures perfect contact with the screw slot, and prevents marring of screw heads. The slow speed also makes screw driver bits last longer. Reverse speed and power are identical to the forward driving conditions, with reverse mechanism conveniently located on rear of motor housing. A button turns to right for forward, left for reverse.

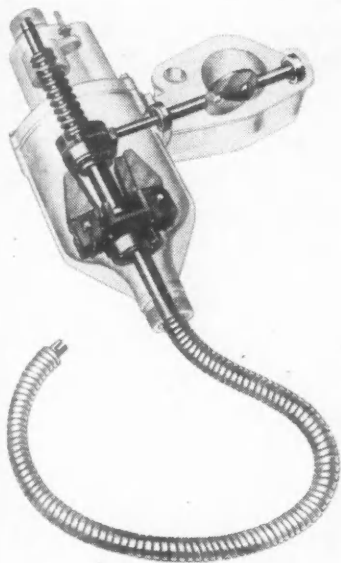
The tool has an adjustable friction

clutch attachment, and is furnished with  $\frac{1}{4}$  in. hex bits and adapters as standard equipment. It utilizes Aro's "O" series motor. Grease fitting on the front of the motor permits lubrication of planetary system at all times.

New housing design of the tool provides perfect balance and ease of handling. It also has a new type finder removable or replaced without taking the attachment from the tool. Exhaust is located forward, above operator's hand and below the attachment. Weight of tool is  $2\frac{3}{4}$  lb. Overall length,  $9\frac{1}{8}$  in.

## P-5—Road Speed Governor

A road-speed governor, manufactured by the Pierce Governor Co., Inc., Anderson, Ind., operates on the centrifugal (flyball) principle, driving off the propeller shaft speedometer gear. Its governing is therefore related only to road speed, or speed at which the wheels are turning, regardless of the speed at which the



Pierce road-speed governor

engine must run to produce that wheel speed. This permits the engine to operate at its most effective rpm in any gear, regardless of load differential or road conditions, up to the pre-determined mph limit at which set. A vehicle under control of this road-speed governor is said to take any hill within its high gear power range at the full governed road speed without restriction.

The governor acts on the sensitive and positive flyball principle, balancing the spinning weights against the tension of a compression spring. The tension of the spring, which is advanced or released by a set-screw, determines the governed speed. The weights are turned by a flexible shaft



For additional information regarding any of these items, please use coupon on page 56

connected to the speedometer drive gear in the transmission. The speedometer, in turn, is driven by the drive shaft of the governor.

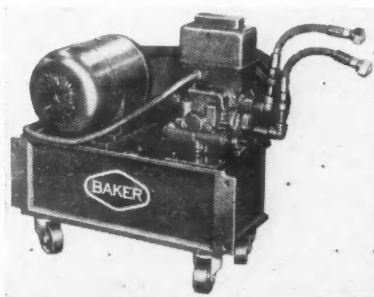
Completely sealed, the governor is tamper-proof, and any attempt to re-adjust or disconnect it at once becomes fully evident. The governor, 9 in. long and 3 in. in diameter, attaches to a throttle box factory-tailored to the manifold throat of the engine on which it is installed.

## P-6—Hydraulic Pump and Tank Unit

A new and completely separate mobile hydraulic pump and tank unit has recently been introduced by Baker Brothers, Inc., of Toledo, Ohio, for use with several new hydraulic feed way type units. The new power unit, mounted on casters, is said to incorporate the advantages of the permanent type hydraulic system, in addition to ready exchangeability of units.

The unit is attached to the operating cylinder of machines by high pressure hose lines joined with self-sealing couplings that permit breaking the line without influx of air into the hydraulic system. Whenever service to the hydraulic system is necessary, a switch of power units may be made by disconnecting these two high pressure hose lines, and connecting a replacement power unit to the machine.

The Baker hydraulic pump unit uses the newly developed Oilgear

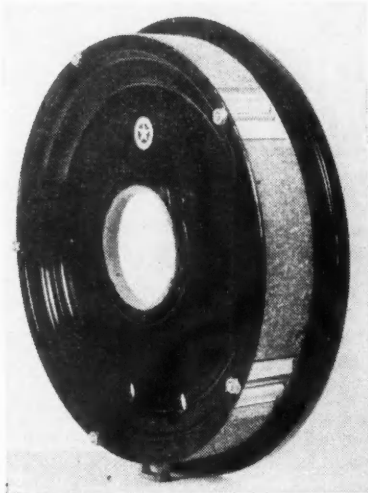


Mobile hydraulic pump and tank unit

model JK10203 variable delivery feed pump of the positive displacement, variable delivery, radial piston type.

## P-7—New Automobile Brake

Development of a radically new automobile brake, with 50 per cent fewer parts than the conventional type; faster, more positive action; greater braking surface and other advantages was recently announced by the Glenn L. Martin Co., Baltimore, Md. The brake is an adaptation



Glenn L. Martin automobile brake

of a radically new type hydraulic airplane brake.

The automobile brake involves use of a continuous ring seal that fits in a groove in the brake shoe support. Hydraulic fluid, actuated by the brake pedal, enters this groove under the seal which is forced outward and actuates the brake shoe in virtually a 360-deg engagement with the drum. No wheel cylinders, pistons and linkages are needed in the new brake.

The ring-shaped arrangement of the braking power applying seal provides for simultaneous application of equal braking force around the brake drum surface.

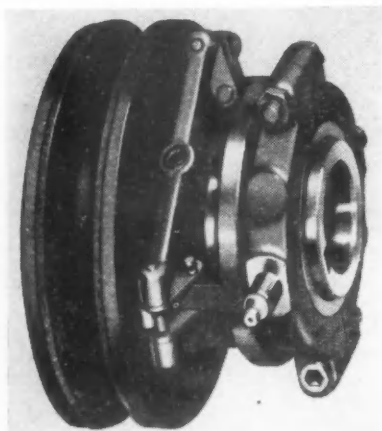
Full movement of the actuating seal of the new brake is attained with relatively little fluid. This allows for extreme sensitivity or responsiveness to pressures caused by operating the pedal. The shoe mounting is such that any degree of serve or self actuation desired by the brake designer may be obtained.

The equalizing movement of the brake segments reduces need of adjustments. However, in the case of large size brakes or where the service is extremely heavy, compensation for wear can be made by limiting the return flow of fluid to the master cylinder, thereby providing for automatic adjustment.



## P-8—Toggle-Type Friction Clutch

The Morse-Rockford Sales Division of the Morse Chain Co., Detroit, Mich., has brought out a complete new line of friction clutches for industrial use. These Morse-Rockford toggle-type clutches, in small compact design, embody the same over-center principle used in high-torque, heavy-duty tractor and hoisting clutches.



Friction clutch for industrial use manufactured by the Morse Chain Co.

The toggles are factory-assembled with the release mechanism and adjusting plate. The entire assembly comes off in one piece when the clutch is disassembled. As an aid to maintenance and inspection there are no small, loose pieces to fall out and get lost during disassembly.

These small-diameter clutches are available for a wide range of applications in two basic designs, in capacities ranging from .5 hp to 1.7 hp per 100 rpm.

## P-9—Supersonic Reflectoscope

The Sperry Products, Inc., Hoboken, N. J., is manufacturing a new supersonic reflectoscope, Type SR05, for non-destructive testing of metals and other materials for internal defects, and for testing welds. Specifications of the new instrument match those of the model presently in usage, but changes have been made in size, appearance and operation.

Elimination of waste air space and a complete re-design of circuits decreases its weight and bulk. The type SR05 is approximately 14 in. by 16 in. by 23 in., and is carried by means of handles on the case, eliminating the wheeled carriage which supported the older instruments. Overall weight of the new reflectoscope is approximately 85 lb or about half the previous weight.

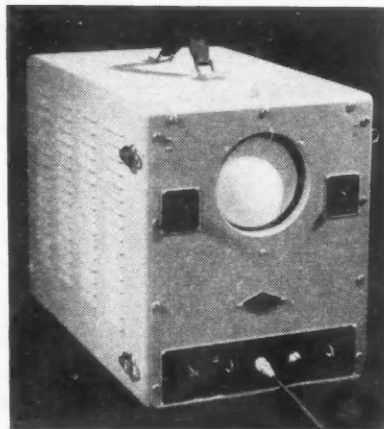
Sensitivity remains the same, but operation has been considerably sim-



For additional information regarding any of these items, please use coupon on page 56

plified by reducing the number of external controls to five. With these controls the operator varies sensitivity, pulse width, sweep length, screen markers, and frequency. Visual indication of internal defects remains unchanged on the oscilloscope screen, but the tube is a smaller, 5-inch, high-intensity type.

This simplified model not only facilitates testing of manufactured



Sperry supersonic reflectoscope, type SR05

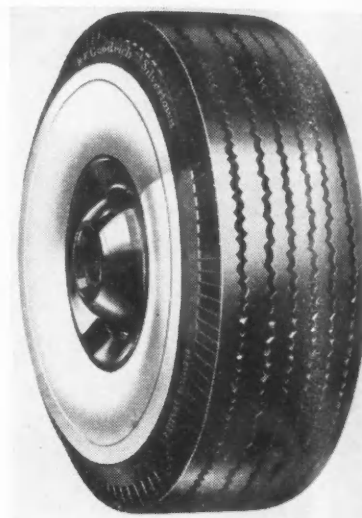
products from raw materials to finished stage, but its increased portability is said to make it valuable for field testing of welds in tanks, pipe and various structures, and for locating fatigue cracks in assembled plant equipment.

## P-10—New Goodrich Low-Pressure Tire

A premium-priced, "velvet pillow" automobile tire, said to combine extra tread width and extra-low pressure, has been brought out by the B. F. Goodrich Co., Akron, Ohio. The larger pillow of air it holds is claimed to give a noticeably softer ride, greatly reducing driving and riding fatigue, and car wear and tear.

The white sidewall of the new tire will be completely free from letter-

ing or numbering, enhancing its appearance and making it easier to



B. F. Goodrich "velvet pillow" tire

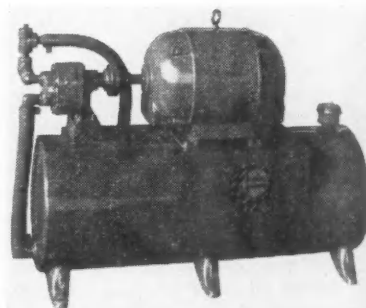
keep clean. The company name, serial number and other lettering is confined to a narrow area outside the white wall.

The new tire has a four-ply carcass and relatively light weight, but with six-ply strength, the company explains, due to use of extra-strength rayon cords throughout and double nylon "shock shields".

## P-11—Packaged Hydraulic Power Unit

Packaged hydraulic power units designed by the Hydro-Power Division of the Hydraulic Press Mfg. Co., Mount Gilead, Ohio, are said to widen application of hydraulics in forming, bending, straightening, pressing, lifting, pulling and lowering operations. Known as the "Cubline", these power units can be used in many diverse industries such as metalworking, steel fabrication, etc.

The Hydro-Power "Cubline" hydraulic power units, available in three capacities, are comparatively small in size, ranging in the vicinity of 18 in. by 48 in. length and width.



Packaged hydraulic power unit of the Hydraulic Press Mfg. Co.

The uses of

# "LOK-THRED"

are unlimited

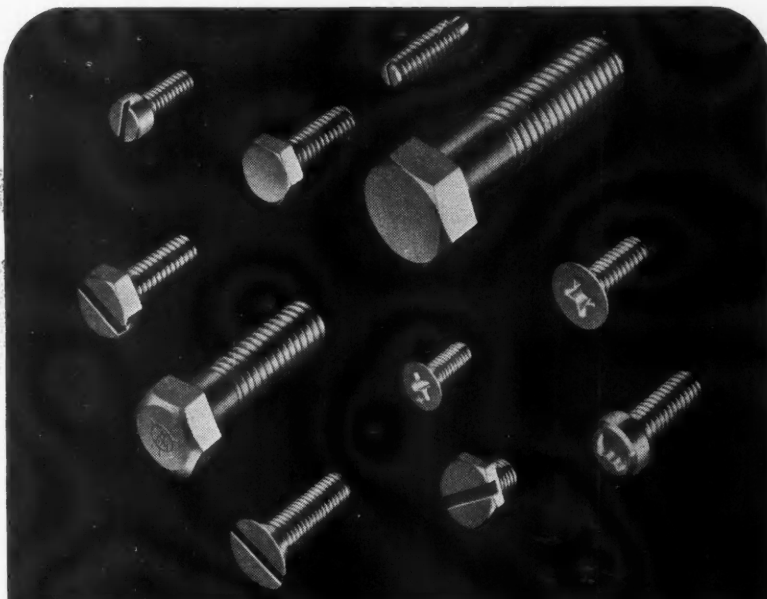
**STUDS, BOLTS OR SCREWS  
LOCK MORE SECURELY...BECOME  
TIGHTER IN SERVICE...FORM  
A SEAL THAT LIQUIDS UNDER  
PRESSURE CANNOT PENETRATE**

The revolutionary "LOK-THRED" that has proved so successful in stud applications can now be made in any type of threaded fastener.

Now the uses of "LOK-THRED" are unlimited. Whether you need a tiny screw or a heavy-duty bolt, you can have the headed fastener you want—threaded with "LOK-THRED".

With the positive sealing action of "LOK-THRED", bosses and blind tapping can be eliminated in many cases. Air and liquids are held under pressure without leakage—suggesting many new uses, such as for water pumps or for cylinder heads.

Write for "LOK-THRED" booklet, today.



## Look at all these Advantages

1. Lock securely and become tighter in service.
2. Have much higher fatigue limits than studs with conventional threads.
3. Stronger in both tension and torsion than ordinary American National Threads.
4. Carry entire normal working load on 6° angle at root of thread under high compressive prestress.
5. Modified American National Threads permit use of standard tools.
6. Re-usable and on any reapplication less than one-half additional turn brings torque back to its original installation value.
7. Do not require selective fits.
8. Do not gall when being driven or fret in service.
9. Act as dowels and taper pins.
10. Seal positively and eliminate added bosses and blind tapping.



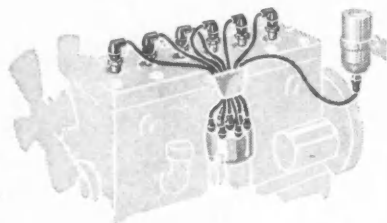
THE NATIONAL SCREW & MFG. COMPANY, CLEVELAND 4, OHIO

Units now available from stock have capacities respectively of 6 gpm, 10 gpm and 15 gpm.

Each power unit consists of a 35 gallon round oil storage reservoir with foot mountings, electric motor, 1000 psi Cubline gear pump; relief valve, coupling, pipe and fittings, suction hose and clamps.

## P-12—Insulators For Distributors and Coils

Sealtight insulators for distributors and coils have been added to the line of Sealtight Corp., Cedar Rapids, Iowa. Now offering complete ignition protection, these new spark plug insulators are said to complete-



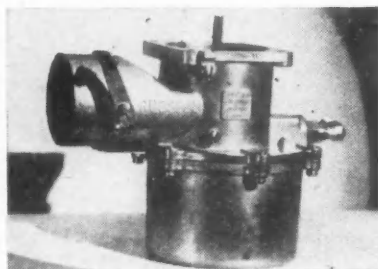
Sealtight insulators for distributors and coils.

ly seal moisture, dirt, oil and dust from the distributor, coil and spark plugs.

The insulators are recommended by the manufacturer for use on all cars, trucks, tractors, boats and any other gasoline engines.

They are claimed to provide quick starting in cold weather, do away with shorting out of ignition under compression loads, and help eliminate fouling of spark plugs. The insulators fit all standard ignition systems.

## P-13—New Carburetor Introduced



Plans have recently been revealed concerning distribution of a new carburetor manufactured by the Russell Carburetor Co. of Shawnee, Oklahoma. The Russell carburetor reputedly works on a completely new principle. All fuel is said to be vaporized, thereby eliminating mixing of gasoline droplets in the cylinders with the oil film. It is also claimed that the carburetor permits a greater percentage of the potential power of the gasoline to be utilized.



For additional information regarding any of these items, please use coupon on any page 56

## P-14—Plastics-Fabric Covering

A new type decorative material suitable for both horizontal and vertical surfaces is now being produced in quantity by the United States Rubber Co., New York City. The material combines fabrics and plastics widely used in war planes and its uses include wall covering in rooms and corridors, furniture surfacing, and tops for tables, counters and desks.

Known as Satusply, the material is now being produced in 34 different colors and patterns, with gloss or satin finish. A cigarette-proof type is available in all colors, designs and finishes. Standard length of rolls of the cigarette-proof type is 60 lineal feet and of the non-cigarette-proof type 90 lineal feet.

In producing Satusply, paper or cloth is completely impregnated and surfaced with a polyester thermosetting resin, then processed under heat and tension. Color and design possibilities are said to be almost unlimited, since a variety of papers or cloths in plain colors, or in designs, can be used as a base. Degree of stiffness can also be controlled during manufacture.

The protective coating formed by the resin makes the non-porous plastic material washable, highly resistant to stains, acids, alkalis and wear.

The plastic material can be manually applied on the job without mechanical pressure, for either new installations or for refurbishing. Because of the continuous rolls, it is possible to cover long corridors or walls with a minimum of time and waste.

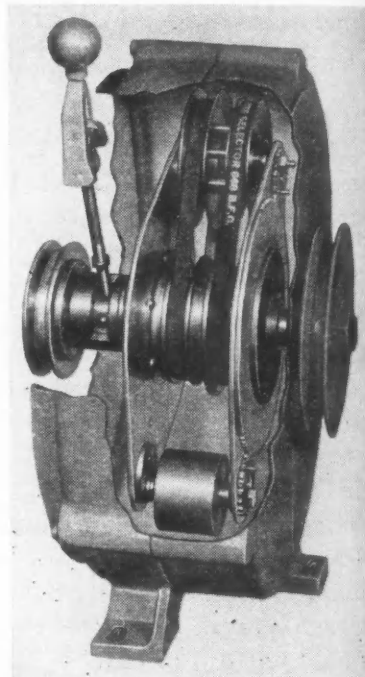
The rubber company is also producing a special cement, called Satusply-Sement, to bond the material satisfactorily to the base surface. For some uses, it is pre-applied to the back of the sheets at the factory, ready for installation in the field. The cement is also furnished in containers for application on the job.

## P-15—Variable Speed Drive

A new 5 hp model revolutionary speed-control having unlimited ratios is introduced by Speed Selector Inc., Cleveland, Ohio

This variable speed drive is said to utilize an entirely new principle of planetary motion applied to speed changers in combination with standard V-belts and variable pitch sheaves, making possible infinite ratio, split-second control of speeds from 0 to 800 rpm and into reverse where needed. Its design eliminates gear shifts, clutches, multi-speed motors, and step pulleys.

Speed Selectors have cast iron sheaves on hardened and ground shafts and guide pins with sealed prelubricated ball bearings, mounted in strong, light cast aluminum hous-



Five hp speed-control, a product of Speed Selector, Inc.

ings. Optional V-belt of flexible coupling input and output make the Speed Selector easily adaptable for mounting in any position on new or existing equipment.

## P-16—Self-Anchoring Lock Nut

The Allenut, made by the Allen Manufacturing Co., Hartford, Conn., is self-anchoring in non-hardened materials, and has a positive wrenching action in applications involving harder materials.

The new nut is positively locked by knurled flutes being drawn down into a counterbored hole as screw is tightened. One-hand wrenching of the screw only is required.



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LYCOMING

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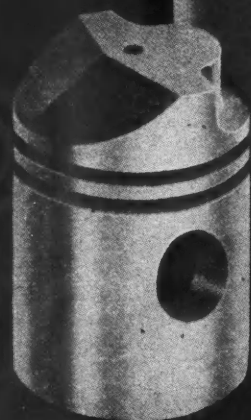


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## PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

### L-1—Cutters

The Ingersoll Milling Machine Co.—Catalog No. 56 describes in detail the complete line of inserted blade milling and boring tools, with special emphasis on new series of carbide tipped Shear Clear face mills for steel and cast iron. The catalog is divided into sections covering Face Mills; Solid Shank End Mills; Arbor Cutters; Helical Cutters; Carbide Tipped Cutters; Boring Tools; Accessories; special Ingersoll machines, etc. and includes several pages showing grinding charts. The catalog is in two colors and attractively illustrated.

### L-2—V\*S Drives

The Reliance Electric & Engineering Co.—Bulletin No. 311 covers latest developments in all electric, adjustable speed (V\*S) drives for a-c circuits. The bulletin contains photographs covering nine specific applications of the drive in as many different industries. Data on constant torque and constant horsepower available in units from 1 to 200 horsepower in size are also supplied, together with typical graphs to illustrate.

### L-3—Floating Disc Clutches

The Carlyle Johnson Machine Co.—The three basic types of Maxitorg floating disc clutches are described and illustrated in a new installation and Data book, No. 48. Design principles are given, together with a list of special applications; specifications for each series. An assembly photograph of the clutch and several typical installations are included.

### L-4—Latex Foam

Rubber Development Bureau—A latex foam "fact" booklet, containing a comprehensive summary of information on this new rubber cushioning material, has been made available. Chapters cover the following information: What Latex is; how it is made; its uses, advantages; sources of supply, etc.

### L-5—Gearmotors

Link-Belt Co.—A new 16-page illustrated catalog, No. 1815, covers double and triple reduction units with integrally mounted electric motors. Various sizes of gearmotors available are tabulated, dimensions given,

average weights and styles or mountings; included are load-classification and selection tables; dimensions of slide rails, etc.

### L-6—Camlock Adjustable Serrated Blade Reamers

Pratt & Whitney Div., Niles-Bement-Pond Co.—An 8-page circular describes the company's adjustable serrated blade reamers. Photographs of the various types are included, together with size and price tables, dimensions, etc. Arbors for use with camlock adjustable serrated blade shell reamers are described and a size and price chart, which also gives dimensions, is included. The number of the circular is 507. Circular 508, giving description and photographs of carbide tipped high speed steel reamers, is also available. It contains size, price and dimension charts.

### L-7—Industrial Truck Batteries

Gould Storage Battery Corp.—The company has announced two new 6-page, 2-color, technical booklets on industrial truck batteries. They include illustrations, descriptions and full technical data on the Gould "Thirty" and the Gould "Kathode" batteries. GB-573, covering the "Thirty" battery contains a giant exploded-view showing every construction feature. Text explains the battery's design and special features, etc. (Turn to page 80, please)

**TIME SAVER COUPON** for your convenience in obtaining, *WITHOUT OBLIGATION*, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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RIES





# New **ARO** Reversible SCREW DRIVER!



## *Save time... Increase Production*

You can change instantly from forward to reverse—just turn button on rear of motor housing.

This new tool, Model 7091, has big power and high driving torque—ideal for No. 1 to 14 machine and wood screws and  $\frac{1}{4}$ " nuts. Has adjustable friction clutch. Low working speed of 750

r.p.m. insures perfect contact with screw slot and prevents marring of screw heads. New housing design gives perfect balance... ease of handling. Feature by feature—it's one of the finest Aro Tools ever built! Ask your Aro Jobber.

**SEND COUPON FOR MORE DETAILS!**

# ARO

**AIR TOOLS**

THE ARO EQUIPMENT CORPORATION, Bryan, Ohio

Without obligation, send us your illustrated bulletin on the new Aro Model 7091 Reversible Screw Driver and Nut Setter.

Name.....

Street.....

City..... State.....

# Three Experimental Vehicles of Revolutionary Design

(Continued from page 37)

ments of the dual-fuel system at various manifold vacuums of a 10 to 1 C. R. engine built by one of the General Motors divisions and advocated more investigation into the octane requirements at part throttle. Harold Gibson, Ethyl Corp. engineer, presented a fuel cost analysis for both systems. Frank Burk, director of Atlantic Refining Company's automotive laboratory, made a preliminary statement on Atlantic's fleet which has been operating with 64 octane gasoline and alcohol-water injection. He reported satisfactory service and although the alcohol-water solution cost about one cent for each gallon of gasoline, this figure was offset by the lower cost of the low octane gasoline. Among the others who spoke were E. J. Bohey, Texas Company; A. T. Coldwell, Thompson Products; R. J. Greenshields, Shell Oil Co.; Austin M. Wolf, consultant engineer; Arthur W. Pope, Jr., Waukesha Motor Co.; Lee Oldfield, Laboratory Equipment Co.; and D. P. Barnard, Standard Oil Co. of Indiana.

During the week Buick, Pontiac and Chevrolet passenger cars with 7.96, 7.5 and 9 to 1 compression ratios and Vitameter equipment were demonstrated by Thompson Vita-Meter Corp. and The Standard Oil Co. (Ohio) and Quaker States Oil Refining Co. Socony-Vacuum had on hand a Chrysler and Cadillac equipped with the dual-fuel system. Engineering Research and Development Corp. demonstrated its new instrument Co., and D. P. Barnard, Standard analysis during road tests.

The symposium on new engine design featured the Packard straight eights, the Willys-Overland six-cylinder passenger car engine, which is being used at present in its Station Wagon, and the Nash L-head Six and Valve-in-head Eight. Their design details were presented in a capable manner by G. A. Sprague, Paul Huber, and E. L. Monson, respectively. The session, which was well-attended, produced plenty of lively discussion, principally on the merits of intake manifold designs and mixture distribution, and also on exhaust valves for high compression engines.

## Suppressors and Fuel Economy

The problem of radiation interference from vehicle electrical systems with radio and television reception has been one of growing importance to the automobile industry during the past 18 years. A detailed review of what has been accomplished since the radio interference problem first received attention in 1930 was given by P. J. Kent, chief engineer of the Electrical Division, Chrysler Corp., in his paper, "The Automotive Industry's Participation in Reduction of Radio and Television Interference."

He reported that the work of various committees has established that the radiation from most vehicles can be reduced to a satisfactory point by use of a 10,000 ohm suppressor at each spark plug, a 10,000 ohm suppressor in the distributor to coil high tension lead, locating of the high tension coil so that the high tension lead from the coil to the distributor shall not exceed eight in. in length, and by keeping the primary electrical wiring, metal rods and conducting tubing as far from the high tension wire as possible.

Installation of suppressors permits a wider spark plug gap, and tests with them have disclosed no effect on engine performance, according to reports received from company engineers. Some have found they can get a smoother idle and better low speed, light load operation. Another interesting possibility is to change the characteristics of the ignition coil so that it will produce a higher secondary voltage without increasing the energy in the spark. Another possibility is that these changes in the electrical system may be used with leaner mixtures to get an improvement in gasoline economy under low speed road load operation. Research work along this line has been carried on recently by some investigators and Chrysler engineering department is now in the process of conduction similar tests, he said.

Mr. Kent announced that major spark plug manufacturers have developed spark plugs in which the suppressor is built into the upper part of the porcelain. One novel development is the incorporation of a high resistance, conducting plastic core in the high tension ignition cable, which has a resistance of approximately 7000 ohms per foot.

Chester Cipriani, senior engineer of the Spark Plug Division, and L. H. Middleton, vice president-engineering, both of Electric Auto-Lite, disclosed that their investigations have shown that resistor plugs up to 20,000 ohms have no practical effect upon starting and require no increase in secondary voltage over those of non-resistor plugs of identical design with the same gap setting. With wider gap settings, the resistor plugs showed a reduction in electrode erosion and when used with an ignition coil of wave front design, there was an increased effectiveness of spark discharge.

## New Test of Fuel Volatility

The production of less volatile gasoline is economically desirable for many refiners now, since refining processes introduced just prior to the war and expanded enormously during it are operating to reduce the

volatility of motor gasolines, and are also causing a wider range of volatility, according to J. E. Taylor, assistant chief automotive engineer, Gulf Research and Development Co., and H. J. Gibson, research coordinator, Ethyl Corp. They believe a procedure is desirable that will enable the engine designer to develop engines insensitive to volatility, and the refiner to compound fuels to fit current engines.

In their paper they outlined in detail a new procedure for evaluating fuel volatility, discussed the problems connected with it, the results of a number of tests with different makes of cars. The procedure consists of running the car at 20 mph, road load, and measuring its performance at the end of each minute until it is fully warmed-up. The measure of car performance is based on the speed attained at the end of six seconds of full throttle operation, starting at 20 mph. This procedure, they say, has proved to be quite reproducible and sufficiently sensitive to study the effects of variations in fuel or engine characteristics on warm-up performance.

## Diesel Fuel Use Increasing

United States now has seven million horsepower of Diesel locomotives and by 1955 there will be at least 30,000,000 hp of this equipment, which will be doing 75 per cent of the railway work, it was predicted by J. W. Barriger, president of the Chicago, Indianapolis and Louisville Railway Co. Pointing to the increasing use of Diesel fuel oils, J. R. MacGregor, G. R. MacPherson and P. L. Pinotti, of the California Research Corp., advised Diesel engine manufacturers to review the fuel requirements of their engines and adopt all possible mechanical aids so that lower quality Diesel fuels can be burned satisfactorily. Otherwise, if the quality of Diesel fuels is to be maintained or improved, they warn that additional refining will be required with its attendant increase in cost.

An excellent review of the fundamentals of steering geometry and its influence on car handling was given by H. E. Churchill, chief research engineer, and P. G. Hykes, experimental engineer, both of the Studebaker Corp.

J. M. Hodge, research associate, Steel Heat Treatment of Carnegie-Illinois Steel Corp., recommended isothermal heat treatment for steels, pointing out that transformation occurs ideally at a single temperature to the precise microstructure desired. He referred to it as a precision heat treatment.

Since a committee of company experts was organized early in 1947 to

(Turn to page 60, please)

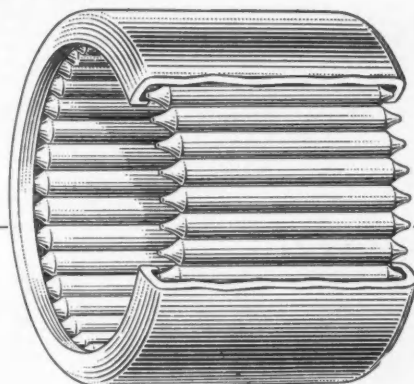


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## Help Make it an Easier Row to Hoe...



Compact Torrington Needle Bearings are used not only in the hydraulic pump of International Harvester's Lift-All, but in the Farmall Model H tractor governor for smooth operation, efficient lubrication and long service life.



**... new farm machines are easing and speeding many a task, aided by the efficient anti-friction performance of Torrington Needle Bearings.**

Power of the tractor engine, transmitted smoothly through a Needle Bearing equipped hydraulic pump, goes to work in the Lift-All at a touch on a lever... raising and lowering cultivators, plows and other direct-connected implements... saving time and backache at the row's end.

In many other farm machines, high-capacity Torrington Needle Bearings play an important part in making the farmer's row easier to hoe, saving time and money by providing smoother anti-friction operation... reducing power consumption... lowering maintenance and lubrication needs... giving longer service life.

The compact, unit design of Needle Bearings also benefits the equipment manufacturer, by contributing to lightweight but rugged construction... saving time in fabrication and assembly.

These Torrington Needle Bearing advantages are important to you in equipment you use, build or sell... so consult our engineers, who will gladly help you adapt them to the requirements of your application.

**THE TORRINGTON COMPANY**

*Torrington, Conn. • South Bend 21, Ind.*

*District Offices and Distributors in Principal Cities*

# **TORRINGTON NEEDLE BEARINGS**

**NEEDLE • SPHERICAL ROLLER • STRAIGHT ROLLER • TAPERED ROLLER • BALL • NEEDLE ROLLERS**

July 1, 1948

59

develop definite technical information on various phases of the surface finish problem, good progress has been made and a paper describing the advantages and limitations of present methods of surface finish measurement and control was given by Clayton R. Lewis, staff research engineer at the Chrysler Corp. and a member of the committee. The most important conclusion revealed by the work to date, he said, is that for optimum results, the surface of each part must be tailored to meet its requirements. For that reason it is impractical to establish any surface finish specification covering the finish to be used on specific parts.

The application of nondestructive testing to automobile parts was reviewed by D. M. McCutcheon, head of the Applied Physics Division, Ford Motor Co. D. F. Toot, Chrysler project engineer, made an analysis of the important comparative physical and mechanical properties of alloy steel, cast iron and aluminum.

Another paper of interest was by L. C. Wolcott, chief engineer of Packard Electric Division, General Motors Corp., who discussed the wiring problems affecting gasoline and Diesel-powered trucks and buses and advocated that wiring should be made to last for the life of the vehicle or the wiring harness should be installed

so that the wires are readily replaceable.

## The Comets

(Continued from page 45)

fitted at the front end of the crankshaft. Connecting rods are polished to assist in crack detection. The aluminum alloy pistons have three wedge-section compression rings, one parallel-sided step-type scraper ring and one slotted oil control ring. The heat treated silicon-chromium valves are faced with stellite and the stems are chromium flashed. Lubrication is under full pressure to main bearings, connecting rods, camshaft and timing, with an intermittent oil squirt to the thrust side of the cylinder bore.

The injection equipment consists of a C.A.V. fuel pump in conjunction with Leyland multi-hole injectors. A vacuum governor fixes the idling speed to approximately 350 rpm and limits maximum speed to 2000 rpm, the vacuum being created by the volume of air passing through a venturi on the induction manifold; the butterfly of this is operated by the accelerator pedal.

The transmission features five gears, of which fifth, fourth and third are in constant mesh, with dog clutches, and the second and first slide on helical splines. A two-stage open propeller shaft with Hardy-Spicer needle roller universal joints carries the power to the rear axle consisting of a cast steel differential casing with two forged steel axle tubes spigotted and secured by flanges and studs. A hypoid bevel gear is used, pinion and gear being carried in angular-contact ball races preloaded to minimize deflection under load. Correct mesh is maintained by accurately machined distance pieces, instead of by shims. Wheel hubs are on taper roller bearings. Standard reduction ratio is 6 1/6 to 1.

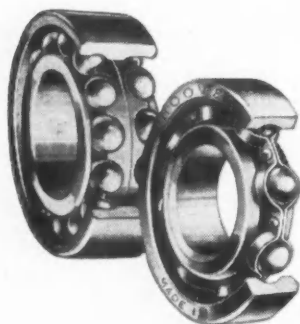
Vacuum assisted brakes are used, the hydraulic master cylinder and the Clayton-Dewandre servo being mounted as a composite unit on the inside of the side rail. Vacuum is produced by an engine driven exhaustor coupled to a vacuum reservoir mounted on the frame. The brakes are of the two leading-shoe type, with direct operation by hydraulic cylinder on each front wheel and a single cylinder for the rear wheels.

The pressed steel driving cab gives semi-forward control. It has flexible rubber mountings at the front to absorb vibration and rigid attachment by four points at the rear. Gross weight of the 170 in. wheelbase chassis, with driving cab and fenders, is 6720 lb. Provision is made for fitting this chassis with a six cylinder gasoline motor developing 100 hp at 2400 rpm. With this unit and 12 volt lighting and starting equipment, weight is reduced by 170 lb.

## HONED RACEWAYS

"ring the bell"

with 30% longer life  
30% greater load capacity



There are few people who can ring the bell at the country fair. This is a task that takes more than strength . . . it takes smoothness, precision and timing.

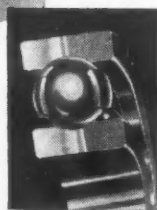
There is only one ball bearing that has honed raceways . . . the Hoover Ball Bearing. The extra precision and smoothness that result from honing increase the life span of Hoover Ball Bearings. Due to honing, Hoover Ball Bearings have closer race curvatures . . . greater area of ball-supporting contact . . . and 30% more load carrying capacity. You get these advantages plus unbelievable quietness with Hoover Honed Raceways.

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OF BEARINGS

Hoover

America's only Ball Bearing  
with HONED RACEWAYS

HOOVER BALL AND BEARING CO. ANN ARBOR, MICH.





# Pixsatorious? Who said that?

So far, no manufacturer has ever asked us to cast a Pixsatorious. But we often cast parts that are just as intricate. C.W.C. is certainly qualified to produce the more difficult type of casting because of three outstanding achievements: (1) 40 years of pioneering and development in metallurgical engineering (2) precision control of the metal before it is poured (3) complete mechanized facilities for production in quantity at greatest economy. If you have a "pixsatorious" that you want *cast in volume* . . . then come to Campbell, Wyant and Cannon.

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SOUTH HAVEN, MICHIGAN: National Motor Castings Div. • LANSING, MICHIGAN: Centrifugal Fusing Co.

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MUSKEGON, MICHIGAN



## Personals

*Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.*

**General Motors Corp.—Bayard D. Kunkle** has been elected to the Board and a member of the Corporation's Operations Policy Committee.

**E. I. duPont deNemours and Co., Inc.—Ernest R. Cathcart** appointed to the position of staff advisor of the Fabric's Div. management. **H. J. Jenemann** was made manager of the Fairfield plant, succeeding Mr. Cathcart.

**Philco Corporation — John M. Otter** has been elected Vice-President and General Sales Manager.

**The Autocar Co.—Hamilton Page** has been elected Secretary, succeeding **William H. Brearley**, retired. **Daniel P. Adams** has been elected to the Board of Directors.

**Wilkening Manufacturing Co. — Harry J. Fischer** appointed Divisional Sales Manager.

**Warner Machine Products, Inc. — Abbott L. Johnson** elected President; **C. S. Davis**, Chairman of the Board; **E. F. Ball**, Vice-President; **R. P. John-**

**son**, Vice-President and **J. E. Johnson**, Secretary and Treasurer.

**American Brake Shoe Co.—Raymond H. Schaefer** appointed Director of Research and Development. **U. B. Grannis, Jr.**, appointed Manager of Equipment Sales, American Brake-blok Div.

**Saginaw Industries Co. — Gene Swift** elected President, succeeding **Rudolph Beuthin**, deceased.

**Hoof Products Co.—H. C. Kepner** has resigned as President of the company.

**Niles-Bement-Pond Co. — A. Price Drummond** has been appointed Manager of Engineering, Machine Tool Div.

**Westinghouse Electric Corp. — Romus Soucek** has been appointed Sales Manager of the Aviation Gas Turbine Div.

**The Dow Chemical Co.—J. C. H. Stearns** appointed Manager of Ingot Sales; **G. W. DeKuiper**, Manager of Wrought Product Sales; **T. H. Caldwell, Jr.**, Manager of Die Castings Sales.

**Chevrolet Motor Div., General Motors Corp.—M. J. Raymond**, Supervisor of Customer Relations, Service and Mechanical Dept.

**Packard Motor Car Co.—C. Wayne Brownell** appointed Industrial Relations Manager. **Frank J. Hoder, Jr.**, Manager of the Marine and Industrial Engine Dept.

**Curtiss-Wright Corp. — C. C. Pearson** elected Vice-President. **William C. Jordan** appointed to succeed Mr. Pearson as general manager of Airplane Div.

**North American Aviation, Inc. — Election** of the following new board members has been announced: **William C. Mullendore**, **Alden G. Roach** and **Chester A. Rude**.

**Consolidated Vultee Aircraft Corp. — LaMotte T. Cohu** elected President and General Manager. Mr. Cohu also became a member of the board of directors, succeeding **V. C. Schorlemmer**, resigned.

**The Ohio Crankshaft Co., Tocco Div. — W. K. Ginman**, manager of newly opened Detroit office.

**Fruehauf Trailer Co. of Canada. Ltd. — Robert T. Hazell**, appointed General Manager.

**Casco Products Corp. — New directors** of the company include **A. G. Wels**, also Secretary of the Company; **J. J. Reidy**, Sales Manager of Home Appliances Div.; **Robert W. Sinclair**, Manager, Detroit office.

**Freedom-Valvoline Oil Co.—Wayne R. Sphar** appointed Advertising Manager.

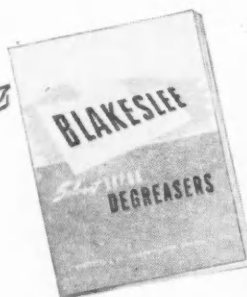
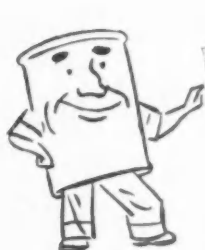
**Elastic Stop Nut Corp. — Bruce F.**  
(Turn to page 68, please)



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Blakeslee Solvent Vapor Degreasers employ a patented degreasing process . . . parts made of metals and alloys chemically cleaned and dried in only a few seconds . . . no need for subsequent rinsing and drying operations. Oil and grease-free surfaces are obtained, complete oil removal from cracks, pores, seams and hidden crevices of machined parts, stampings, assemblies, etc., is assured. Masses of nested parts are thoroughly cleaned and dried throughout.

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In this cleaning process, the oils and greases are dissolved by **BLACOSOLV**, the efficient degreasing solvent which can be used on all metals or combinations of metals. **BLACOSOLV** is non-inflammable and non-explosive.

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"You can't drive a spike with a tack hammer." You just can't handle the high speeds and heavy feeds that, with carbides, mean high production unless you have a machine that is built from the ground up to do the job.

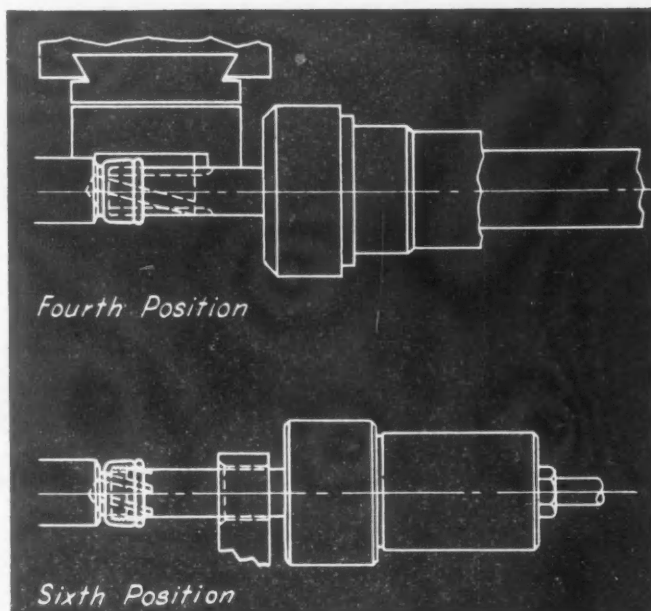
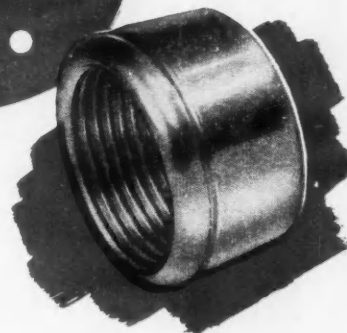
Here's a case where a carbide-tooled New Britain Model 601 automatic screw machine operating at spindle speeds of 3352 RPM, with a forming SFM of 1098, produces 1433 finished pieces per hour. Eight operations complete the aluminum ferrule, illustrated. Two of these operations shown at the right eliminate secondary finishing work.

Carbides can mean new standards in speed and economy in your plant. To help you attain them New Britain makes the only automatic screw machines designed with the power, speed, weight and rigidity to get the full benefit with carbides.

After forming and drilling in the first three positions a carbide skiving tool with no back clearance burnishes the piece eliminating a secondary polishing operation and readying the part for immediate plating.



Easily accessible cams, directly behind cross slides, eliminate deflection and permit heavy forming cuts of carbides.



Tapping is done in the fifth position. Breaking through the  $\frac{1}{64}$ " radius, a finish reamer cuts off in #6. This leaves a complete radius blending in with the back face as specified by the manufacturer. The piece is stripped from the reamer on drawback stroke. Ordinary cut-off methods would have required secondary grinding.

Write for descriptive literature on new Models 601 and 602



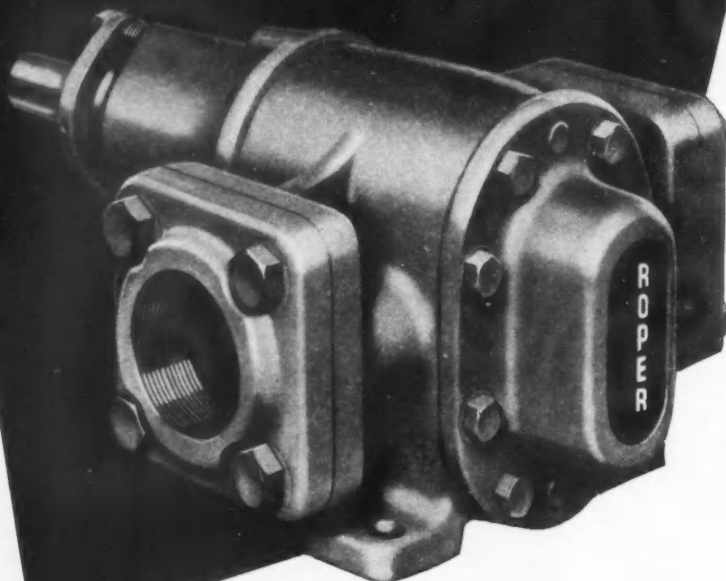
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*Automatics*

THE NEW BRITAIN MACHINE COMPANY  
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NEW BRITAIN, CONNECTICUT

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Venturi suction and discharge principle provides properly proportioned distribution of liquid pumped, thereby minimizing energy loss through turbulence, cavitation, or friction.

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Illustrated literature describes models and specifications of pumps in the Roper line. Ask for yours today.



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## Business in Brief

Written by the Guarantee Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

Moderate reduction of general business activity is indicated. The *New York Times* index for the week ended June 5 stands at 146.0, as against 151.7 for the preceding week and 145.1 a year ago.

Sales of department stores during the week ended June 5, as reported by the Federal Reserve Board, equaled 282 per cent of the 1935-39 average, as compared with 297 in the week before. Sales were four per cent below the corresponding distribution a year earlier, as against a preceding excess of 19 per cent. The total in 1948 so far reported is seven per cent greater than the comparable sum in 1947.

Electric power production decreased contraseasonally in the week ended June 5. The output was 4.5 per cent above the corresponding amount in 1947, as compared with a similar advance of 14.6 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 821,213 cars, 9.2 per cent less than the figure for the week before and 8.8 per cent below the corresponding number recorded in 1947.

Crude oil production in the week ended June 5 averaged 5,475,800 bbl daily, a new peak, 24,150 bbl more than the preceding average and 411,600 bbl above the comparable output in 1947.

Production of bituminous coal and lignite during the same period is estimated at 12,980,000 net tons, 3.4 per cent less than the comparable amount a year ago. The total production in 1948 so far reported is 12.5 per cent below the corresponding quantity in 1947.

Civil engineering construction volume reported for the week ended June 10, according to *Engineering News-Record*, is \$174,146,000, or 29 per cent more than the preceding weekly figure and 10 per cent above the comparable sum in 1947. The total recorded for 24 weeks of this year is 25 per cent more than the corresponding amount in 1947. Private construction is two per cent above that a year ago, and public construction has increased by 58 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended June 5 stands at 164.2 per cent of the 1926 average, as compared with 147.9 a year ago.

Member bank reserve balances increased \$60 million during the week ended June 9. Underlying changes thus reflected include reductions of \$337 million in Reserve bank credit and \$423 million in Treasury deposits with Federal Reserve banks, accompanied by a decline of \$31 million in money in circulation.

Total loans and investments of reporting member banks decreased \$134 million during the week ended June 2. A decline of \$91 million in commercial, industrial and agricultural loans was recorded. The sum of these business loans, \$14.13 million, shows a net increase of \$2361 million in 12 months.



# On The ROAD...

WHERE IMPROVEMENT KEEPS PACE WITH INDUSTRIAL PROGRESS



*Industrial progress and highway improvement are co-essentials in national development. American road builders have successfully kept pace with industrial progress by developing methods and equipment necessary in building better roads faster. Chicago Rawhide has had the privilege of serving many leading manufacturers of tractors and other road machinery by designing and producing for them a variety of Sirvis mechanical leather parts. These include several types of oil seals, cup leathers, diaphragms, protective boots and similar pliable parts. Let Sirvis serve you, too, in the solution of your mechanical sealing problems.*

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**Cincinnati • Minneapolis • Syracuse • Peoria**

# STEEL ALLOCATION SLIPPED INTO DRAFT LAW

By George H. Baker  
Washington Bureau,  
Automotive Industries

Twenty per cent compulsory set-aside of steel output. That's what it may amount to as the result of the new draft bill, signed into law by President Truman, which includes a guarantee that small business will receive all the steel it needs for defense orders.

The guarantee was slipped into the

controversial draft bill by Chairman Ploeser, R., Mo., of the House Small Business Committee. Small business estimates that it has been receiving only about four per cent of the total steel output in recent months. The guarantee amendment should up this to somewhere between 15 and 20 per cent, according to Mr. Ploeser.

Control-minded congressmen had expected Mr. Ploeser to introduce

his set-aside proposal in the form of a bill. But such a bill would have hit insurmountable hurdles in both Senate and House, and Mr. Ploeser knew it. So he waited until House military leaders were making a last desperate attempt to save the draft bill and then threw in his amendment providing for set-asides. There was no objection—either from Republicans or Democrats. Caught off guard and with only a few hours to go before adjournment, Congress agreed to Mr. Ploeser's proposal.

Briefly, the new law states that the President is empowered (through the Secretary of Defense) to require steel producers to supply all the steel that any concern having a defense contract can use to fulfill such a contract. Putting it another way, if you hold a defense contract with the Federal Government and can't get enough steel to carry out that contract, tell the Secretary of Defense about it. The Ploeser amendment says the Secretary of Defense will put the finger on the steel producers to see that you get it. The amendment states:

"Compliance with such requirement shall be obligatory on all such producers of steel and such requirement shall take precedence over all orders and contracts theretofore placed with such producers.

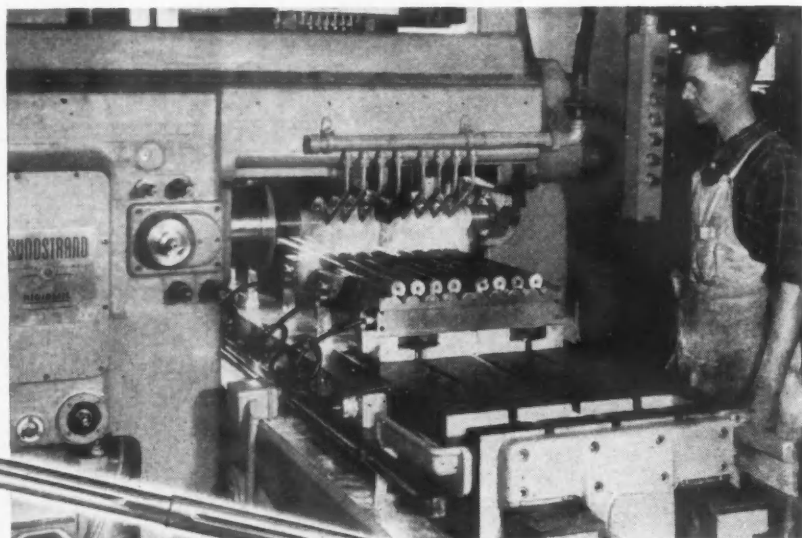
"If any such producer of steel or the responsible head or heads thereof refuses to comply with such requirement, the President, through the Secretary of Defense, is authorized to take immediate possession of the plant or plants of such producer, and, through the appropriate branch, bureau, or department of the armed forces, to insure compliance with such requirement.

"Any such producer of steel or the responsible head or heads thereof refusing to comply with such requirement shall be deemed guilty of a felony and upon conviction thereof shall be punished by imprisonment for not more than three years and a fine not exceeding \$50,000."

Mr. Ploeser's amendment also states that the President "shall recognize the valid claims of American small business" to participate in the defense program. It provides that small business shall receive a "fair share" of orders placed exclusively for the use of the armed forces or other federal agencies. "Small business" is defined as an enterprise not dominant in its trade or industry, employing fewer than 500 persons, and independently owned and operated. As in wartime, the President is authorized to seize any plants or factories that fail to fill armed service orders at a fair price.

Aside from the Ploeser amendment, there are a lot of other provisions in the new draft law of interest to industry. The total manpower strength of the armed forces

(Turn to page 68, please)



## Milling Keyways

**EASIER - FASTER**

### with Power-Grip Holding

Photograph shows eight shafts held with POWER-GRIP CHUCKS. Four keyways 5" x 1/2" x 1/4" deep are milled in each shaft. Shaft is 1-5/8" dia. with ends 1-1/2" dia. Cutters are 6" dia. staggered tooth H.S.S. side mills. Feed rate is 5" p.m., and rapid traverse 300" p.m. Diameters down to 11/16" are milled in same fixture.

For milling keyways in large or small shafts, shafts with multiple diameters, in production quantities, or short runs of mixed sizes, Power-Grip Chucks and Fixtures represent a modern magnetic holding technique. Deep magnetic penetration, accomplishing extreme holding power with low voltage, makes possible fixtures adaptable to a wide range of sizes.

Send us prints of your keyway or other milling jobs, so we can submit our proposal for Power-Grip Holding.

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# GREENLEE

## AUTOMATIC TRANSFER PROCESSING MACHINES SHOWN IN NEW SOUND MOVIE



### FOUR NEW MACHINES BUILT TO PROCESS AUTOMOBILE ENGINE CYLINDER BLOCKS

A new 16 mm. black and white sound movie features four recent Greenlee Automatic Transfer Processing Machines built to handle all the important machining operations on several sizes of automobile engine cylinder blocks. It shows how the individual heads on the machine work, and how the blocks are transferred, rotated, positioned, clamped, and machined in a continuous automatic cycle.

#### FOR INTERESTED TECHNICAL GROUPS

This film is furnished on a loan basis to any technical groups interested in studying the operating characteristics of Greenlee machines. To obtain it, simply direct a letter identifying the film, the time you would like to have it, and the approximate number of people who will view it. Write to Greenlee Bros. & Co. at the address shown below. There is no charge or obligation for the loan of this film.

#### ALSO AVAILABLE . . .

##### SCREW MACHINE MOVIE

Another Greenlee sound movie available on the same basis is a 30-minute film showing the building of a Greenlee Six-Spindle Automatic Screw Machine. It explains hidden details of construction and is an aid to operators and maintenance men.



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MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES



is to be raised to 2,005,882. The Army's strength is to be upped to 837,000; Navy and Marines to 666,882, and Air Force to 502,000. Men from 19 through 25 years can be drafted for 21 months' service. Almost all veterans are exempt. The first draftees will be called 90 days from the date the bill became law.

The President is authorized to defer necessary men in industry, agriculture, science and other fields. Married men and those with dependents also would be deferred. College students may complete a school year before answering a draft call,

and high school students would be deferred until graduation or twenty years of age, as long as they do satisfactory class work. Drafted men will have the same right to reclaim their jobs that existed under the wartime draft law.

A national selective service organization, similar to the set-up headed by General Hershey during the war, is now being established. It will be headed by a national director who draws a \$12,500 annual salary. Volunteer local boards, however, will handle the grass-roots work, much as they did during wartime.

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FRONT AND DUAL REAR  
IN 20", 22", AND 24" SIZES  
TO FIT MANY POPULAR  
TYPES OF TRUCK AXLES

MADE BY  
**GUNITE FOUNDRIES**  
ROCKFORD, ILLINOIS

**GUNITE Cast Wheels**—both Truck Fronts and Truck Dual Rears—are made with many distinctive design features for greater strength, safety, and durability. These include deep-spoke structure that provides practically straight-line stress transfer from rim to outer bearing; extra-wide, non-slip lugs on floating rim bolts; and ventilated spacer (on rears). Gunites are made of strong, controlled-quality cast steel (except for 20" fronts, which are malleable iron). Accurate machining assures proper fit on standard axles. Famous Gunite Brake Drums are integral parts of these cast wheel assemblies. *Buy GUNITES—for better trucking!*

GUNITE WHEELS ARE CAST AND FINISHED IN GUNITE'S OWN FOUNDRIES AND MACHINE SHOPS

## Personals

(Continued from page 62)

**Linck**, appointed Sales Promotion Manager.

**Castaloy Corp.**—**John W. LeDuc** appointed Vice-President.

**Standard Motor Products, Inc.**—**Alfred Roffman** appointed Advertising Manager.

**Carnegie-Illinois Steel Corp.**—**R. F. Miller** appointed assistant to vice-president.

**Koppers Co., Inc.**—**Fred C. Foy** appointed vice-president and manager of Sales Dept., Central Staff.

**Lynn Products Co.**—**Harry C. Hosfield**, Marketing and General Sales Mgr.

**Commonwealth Engineering Co.**—**Malvern J. Hiler** appointed Vice-President in charge of Customer Relations.

## CALENDAR

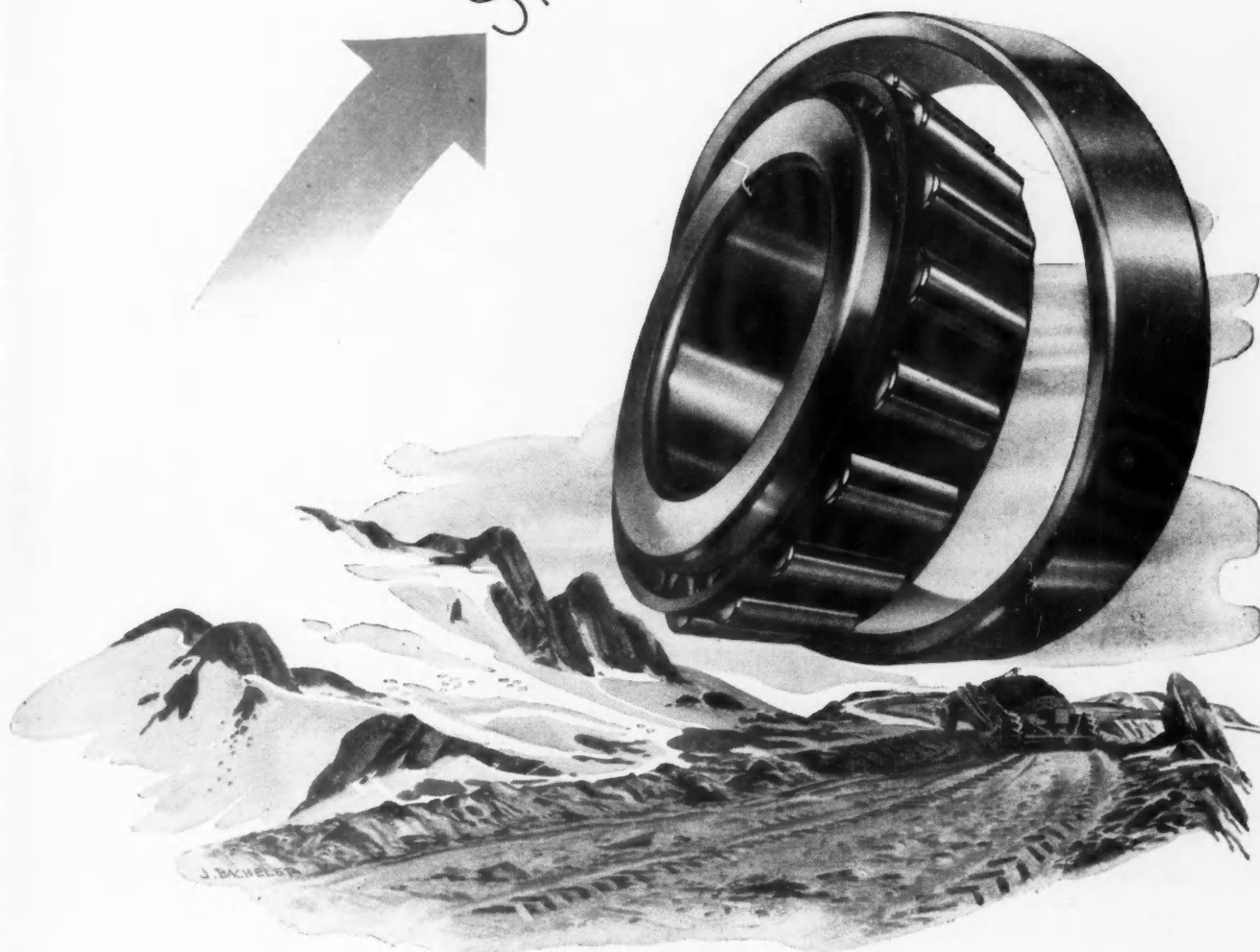
Amer. Roadbuilders' Assoc. Road Show	July 16-24
Chicago	July 16-24
Texas Soaring Assoc. S. W. Soaring Contest, Grand Prairie, Texas	July 23-Aug. 1
Nat'l. Auto. Aces. Assoc., Convention & Show, Chicago	Aug. 9-12
SAE West Coast Mfg., San Francisco	Aug. 18-20
Wisconsin Centennial Automotive Expo. Milwaukee	Aug. 27-29
Natl. Air Races, Cleveland	Sept. 4-6
SAE Tractor & Diesel Eng. Mfg. Milwaukee	Sept. 7-9
Soc. of British Aircraft Constructors Annual Air Show, Farnborough	Sept. 7-12
Instrument Soc. of Amer., Natl. Instrument Conf. & Exhibition, Philadelphia	Sept. 13-17
Industrial Experimentation Training Conf., Columbia University	Sept. 14-18
Turin (Italy) Auto Show	Sept. 15-26
Natl. Assoc. of Foremen Convention & Silver Anniversary, Phila.	Sept. 23-25
3rd Natl. Plastics Expo. New York City	Sept. 27-Oct. 1
Commercial Motor Transport Show, London	Oct. 1-9
SAE Aeronautic & Aircraft Eng. Display, Los Angeles	Oct. 6-9
Paris Auto Show	Oct. 7-12
Inst. of Traffic Engineer Annual Mtg. Phila.	Oct. 11-13
SAE Production Mtg., Cleveland	Oct. 21-22
Amer. Welding Soc. Annual Mtg. Phila.	Oct. 25-29
Amer. Soc. for Metals Nat'l. Metal Congress & Expo., Phila.	Oct. 25-29
London Passenger Car Show	Oct. 27-Nov. 6
Society of Motor Mfrs. International Motor Exhibition, London	Oct. 28-Nov. 6
SAE Fuels & Lubricants Mtg., Tulsa	Nov. 4-5
Automotive Service Industries Show, Navy Pier, Chicago	Dec. 6-10
SAE Annual Mtg., Detroit	Jan. 10-14
Natl. Auto Dealers Assoc. Convention & Equip. Exhibit, San Francisco	Jan. 24-27

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Automotive Industries  
are Always  
Well Informed

AUTOMOTIVE INDUSTRIES

BOWER BEARINGS ARE

SPHER-O-HONED



### FOR GREATER DEPENDABILITY—LONGER LIFE

Extra years of smooth, trouble-free performance are built into every Bower SPHER-O-HONED bearing. This premium of dependability, the result of important new design and engineering improvements, keeps maintenance costs down—increases efficiency.

Contacting roll ends and flange surfaces of Bower SPHER-O-HONED bearings are spherical before the bearing is installed. This greatly reduces initial wear and resultant "end play." The large Bower oil groove solves oil failure problems by carrying a continuous supply of lubricant to all vital working parts. And the hard surfaces of Bower bearings mean greater precision, better alignment, longer life.

Leading manufacturers of earthmoving equipment use Bower SPHER-O-HONED bearings. They've found—and you will too—that for all-around reliable performance they're your best bearing buy.

*For more complete information, write for the  
Bower Engineering catalog.*

**BOWER ROLLER BEARING COMPANY**  
DETROIT 14, MICHIGAN

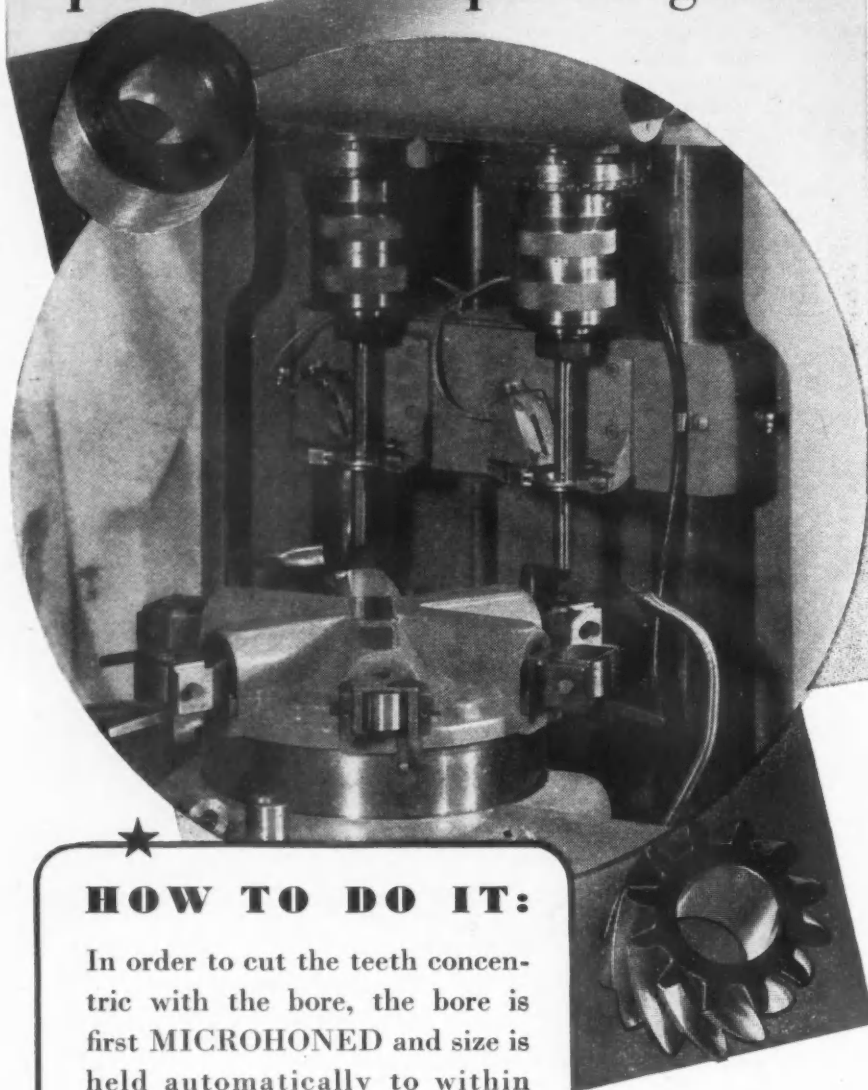


# BOWER

**ROLLER BEARINGS**

# MICROHONE★

for 300% to 400% MORE  
production of pinion gears



## ★ HOW TO DO IT:

In order to cut the teeth concentric with the bore, the bore is first MICROHONED and size is held automatically to within .0003". The blanks are pressed on an arbor and the teeth are cut. After heat treating, the bore is again MICROHONED to correct any distortion caused by heat treating and to generate any desired surface finish.

No  
pitch diameter  
wobble!

★Trademark Reg. U.S. Pat. Off.

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## Role of Heat Treating Research

(Continued from page 43)

be used in this capacity, with some temporary wiring, at any point within the heat treat area. Complete facilities, however, have been provided at either end of the panel to use this unit, as well as the Brown circular chart instrument beneath it, for operation of small tube and muffle furnaces, on 115 volt power, by means of direct plug-in connections.

The control instruments for the various heat-treating units are all Brown circular chart electronic controllers and are mounted in the various sections of the instrument board.

The instrument board, seen in the illustration, comprises six sections. Two sections house the control instruments for the pit carburizing furnace, which is seen in the foreground of Fig. 2.

### PIT CARBURIZER

The pit carburizer is a three-zone furnace; that is, the heating element of the furnace is divided into three zones, each of which is equipped with an individual thermocouple. In this way, a uniform temperature is maintained throughout the furnace and a more precise control of temperature is obtained. Each of the three "MA" (Chromel-Alumel) thermocouples is connected to the electronic controller which controls the temperature of the zone in which the associated thermocouple is located.

As the temperature of the zone rises to the set point, power is continuously applied to the heating element. When the temperature of the zone exceeds the set point, the switches within the control instrument operate a relay which cuts the power off the heating element. Power is re-applied as the temperature drops below the set point.

An identical control action occurs in each zone of the furnace. By adjusting the set points of all three instruments for the same temperature, a uniform temperature of the desired value is maintained in the carburizer. The inherent accuracy of the electronic type of instrument makes it possible to use on-off control and show practically straight-line control on the temperature record.

The pit carburizer panel is equipped with two three-position switches, which have positions marked "Hand," "Off," and "Auto." One of these switches controls the main power supply to the furnace, while the other connects into the control circuit of the electric timer, previously described.

The power switch, when in the "Auto" position, ties the Brown instrument into the circuit for automatic control, while in the "Hand" position power is connected directly to the furnace, and temperature con-

(Turn to page 72, please)



# SPRAY

## that builds

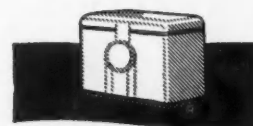
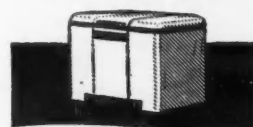
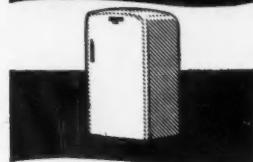
# Endurance

### for the finest paint finishes



It's the Bonderite spray! Metal parts traveling through it emerge with a close-grained coating of nonmetallic Bonderite crystals, ready to take and *hold* the final paint finish.

The Bonderite spray builds long life for paint. By inhibiting rust and corrosion and providing a secure anchor for the paint film, Bonderizing acts to prolong fine appearance and service life. Bonderizing is fast, economical, simply and positively controlled. Results are uniformly effective. Automobiles, home appliances, office equipment—and many other metal products on which a *lasting* quality paint finish is important—are Bonderized. Bonderized products look better longer!



**YOUR Product, too, Deserves Bonderizing!**

*Guard its good looks—and your customers' satisfaction—by Bonderizing before the final finish. It costs little, adds much. Write today for full information.*

# Parker

**PARKER RUST PROOF COMPANY**  
East Milwaukee Ave.  
Detroit 11, Michigan

**BONDERIZING Holds Paint to Metal . . . PARKERIZING Inhibits Rust . . . PARCO LUBRIZING Retards Wear on Friction Surfaces**

trol is by manual operation of the switch. When the power switch is in the "Off" position the power is cut off from the furnace elements.

The second switch leaves the furnace entirely under the control of the Brown instrument in one position, adds the automatic timer to the control circuit in another, and shuts the furnace off in the third. As previously mentioned, additional switching arrangements have been provided to transfer one of these three control instruments, when the carburizer is not in use, to another circuit with power and thermocouple connections at both ends of the instrument panel.

These connections are used for the operation of small auxiliary furnaces.

Operation of each furnace zone is indicated by a pair of lights, mounted on the instrument panel. One, a red light, glows whenever the corresponding zone is below the set point and the other, a green light, glows only when the zone is at or above the set point. When neither of these lights is on, the zone is not receiving power, and when both are lighted, the circuit breaking contactor is stuck. Thus, in addition to indicating when the furnaces are at the set point, the lights serve another useful purpose.

#### OTHER HEAT-TREATING UNITS

The box type brazing furnace shown in Fig. 3 is controlled and operated from its individual instrument panel (third from left). The selector and control switches (indicating lights) and relay are a duplication of those used for the carburizing furnace. However, the brazing furnace operates as a single zone and requires but one control instrument, thermocouple, and a single pair of indicating lights. Because it is used at high temperatures with a reducing atmosphere, this furnace was supplied with a Ni, Ni-Mo thermocouple, which is believed to maintain better calibration under such conditions.

The electrically-heated salt bath is seen, left background of Fig. 2. The operating and control set-up is practically the same as that used for the brazing furnace, and is effected from the control panel labeled "Electric Salt Bath" (third from right in Fig. 1). The same type of electronic recording controller is used except that it is calibrated for MA thermocouples.

The gas-fired salt bath, seen at the right of the electric salt bath in the background of Fig. 2, is operated and controlled from the panel marked "Gas Salt Bath" (second from right in Fig. 1). The recording control instrument is calibrated for use with an MA thermocouple which is immersed in the salt bath. Because the unit is gas-fired, pneumatic control is used.

The electronic control instrument is equipped with a Brown Air-o-Line unit which provides full throttling control with automatic reset. This type of control provides precise maintenance of the desired temperature regardless of load changes.

In operation, temperature deviations from the setting on the Brown instrument produce variations in air pressure which result in the action of the Air-o-Line unit to bring the furnace back to set point. These changes in air pressure are transmitted through an air line to the air-operated diaphragm motor valve, seen in Fig. 2 at right of the gas-fired salt bath.

The diaphragm motor valve regulates the heat applied to the salt bath by controlling the gas input to the burner. In this way, the temperature of the salt bath is maintained constantly at the set point.

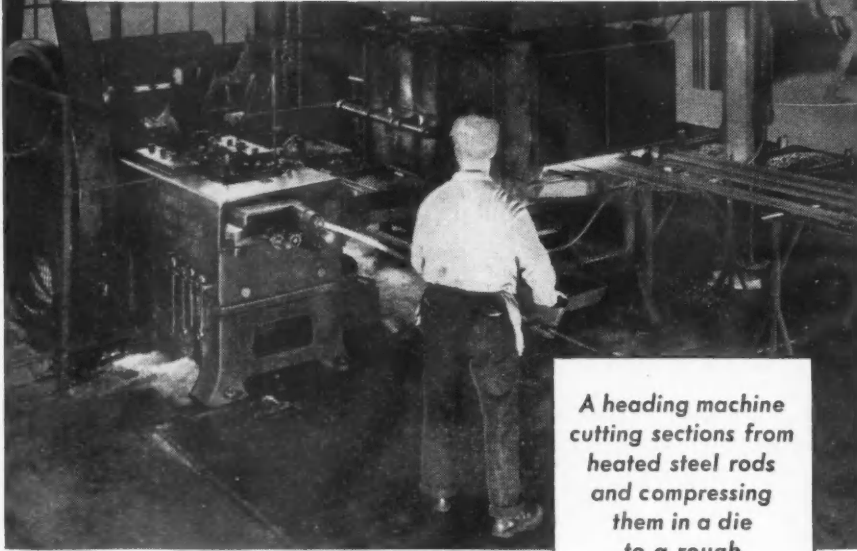
The gas-fired salt bath cannot be turned on automatically because the sources of air and gas are independent of the control panel. It is possible, however, to operate this furnace by either manual or automatic control by means of a Brown control by-pass panel, seen just below the controller on panel No. 5, which replaces the three-position switch used on the electric furnaces.

The sixth panel, shown in Fig. 1, provides means for operation and control of the tempering furnace.

(Turn to page 74 please)

**This is How**

**STROM BALLS are Born**



A heading machine cutting sections from heated steel rods and compressing them in a die to a rough spherical shape

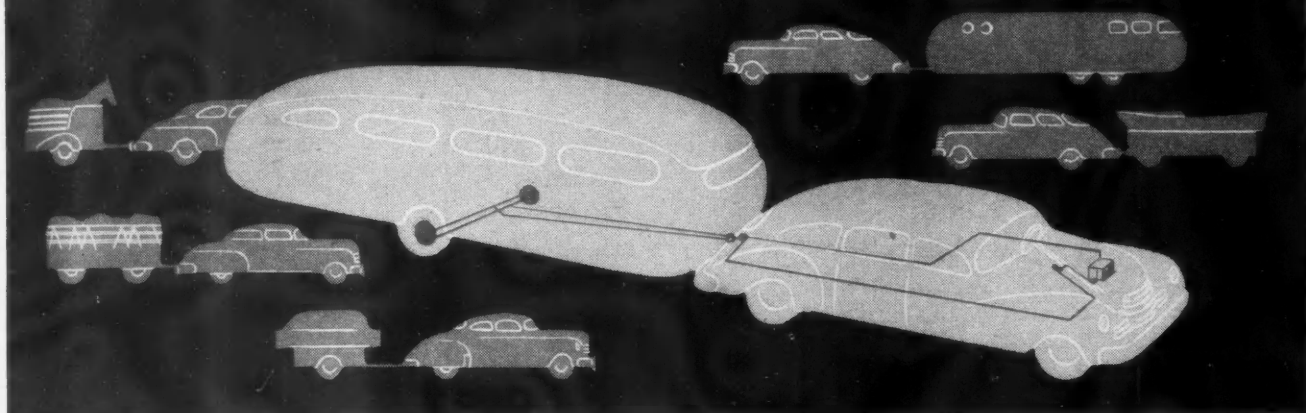
The steel is carefully chosen and inspected, even before it gets to the heading machine. After being "born" here, balls are carefully "brought up," through a long series of grinding and lapping operations, to the unbelievably high standards of finish, sphericity and precision which have made Strom Metal Balls the standard of Industry. Strom Steel Ball Co., 1850 South 54th Avenue, Cicero 50, Illinois.

**Strom** BALLS  **Serve Industry**

**Largest Independent and Exclusive Metal Ball Manufacturer**

# KELSEY-HAYES ELECTRIC BRAKES

## Stop Trailers Faster, Smoother, Safer!

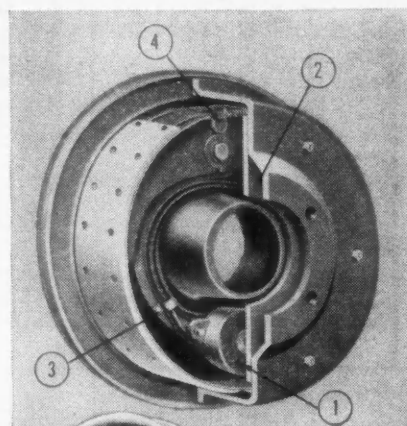


**Made by Kelsey-Hayes—World's Famous Producer  
of Wheel and Brake Equipment . . .**

Kelsey-Hayes "Magdraulic" Electric Brakes are recognized as the ideal system for house trailers, utility trailers, farm wagons, implements, and industrial equipment.

- Kelsey-Hayes' superior Electric Brakes have greater power-to-brake size for handling overloaded conditions.
- Kelsey-Hayes' superior Electric Brakes, fully adjusted at the factory, require no adjustment during or after installation.
- Kelsey-Hayes' superior Electric Brakes are the easiest and cheapest to install, hook up, operate, and require no running-in period.
- Kelsey-Hayes' superior Electric Brakes cannot freeze, have self cleaning action, are self aligning, are smoother, more powerful, safer.

- 1 A mere feather-touch of the control instantly sends current to this electromagnet to press it against the armature disc.
- 2 This armature disc, rotating with brake drum, develops a frictional force to pull the magnet across the face of the armature disc.
- 3 This lever, moved by the magnet mounted at its end, multiplies the magnet force to give a very high torque output against the actuating pin.
- 4 This actuating pin then moves the brake shoe links to spread the brake shoes, thus pressing the brake band against the drum.



Kelsey-Hayes' Nation-Wide Sales and Service on Wheels, Hubs, Drums and Brakes, Through 47 Distributors in 25 States Assures Greatest Convenience, Wherever You Are.



... ASSURES PROVEN PRODUCTS AT ...

**KELSEY-HAYES WHEEL COMPANY**  
DETROIT 32, MICHIGAN



Wheels—Hub and Drum Assemblies—Brakes—"Vacdraulic" Brake Power Units—for Passenger Cars, Trucks, Buses—made by Kelsey-Hayes' 4 Michigan Plants and Windsor-Canada Plant • "Magdraulic" Electric Brakes—"Lathan" Vacuum Power Brake Equipment for Tractor-Trailers—made by Kelsey-Hayes' South San Francisco-Lathan Plant. Wheels—Hubs—Axles—Parts for Farm Implements—made by Kelsey-Hayes' French & Hecht Plant at Davenport, Iowa.



The controller, relays, switches and thermocouple are duplicates of those used for the electric salt bath. The control and operating methods are also the same, except that on this furnace a manually-started fan with an air switch must be in operation before power is applied to the heating elements.

#### EXCESS TEMPERATURE PROTECTION

All of the furnaces except the gas-fired unit are provided with excess-temperature protection in the form of separate thermocouples connected to limiting pyrometers mounted on the control panel. The carbur-

izing, brazing and tempering furnaces are shut off at the power contactor when the furnace temperature rises above a preset limit, and at the same time a warning bell, mounted above the panel, signals the condition to the operator's attention. The excess-temperature units must be manually reset and the trouble must be corrected before the furnace can again be put into operation.

In the case of the electric salt bath, the excess-temperature thermocouple is mounted in the furnace winding. Should the unit overheat due to a large load cooling the salt pot (and the control thermocouple, which is in the salt) far below the

set point, the unit is temporarily shut off by the action of the excess-temperature control. In this way, damage to the furnace winding is prevented.

As a result of the well-engineered layout, plus instrumentation, full flexibility of operation and of control is attained for each heat-treating unit. Essentially straight line control is obtained for each of the five furnaces. The resulting precision control and measurement of temperatures provides the foundation for the heat-treating work involved in this portion of metallurgical research.

## Car Problems British Racing

(Continued from page 40)

cars and will deliver the units complete, ready for fitting.

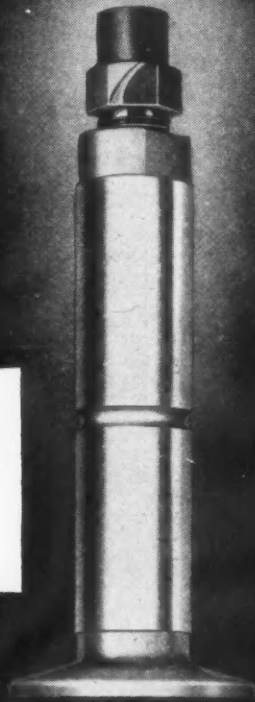
Among the difficulties to be faced are the lack of a testing ground and experienced drivers. No race track exists in England and no manufacturer maintains a proving ground. Efforts are being made to secure the return of Donington, now in the hands of the military, but without success. British manufacturers as a body appear to see no use in a race track and have already decided against petitioning for Donington to be again used as a test track. The attitude of the Government is that if manufacturers are not united on the need for a track, they will not take it away from the army.

With all highways closed and no track available, the final preparation of the racing cars will be difficult. The cars will have to be sent to France for try outs; sponsors wish to avoid this. There are practically no trained race drivers in England and without a track it will be difficult to develop the raw material at hand. This difficulty may be overcome by taking in at least one experienced foreign race driver.

**pillars** of engine performance



**JOHNSON  
TAPPETS**



AUTOMOTIVE • AVIATION • MARINE

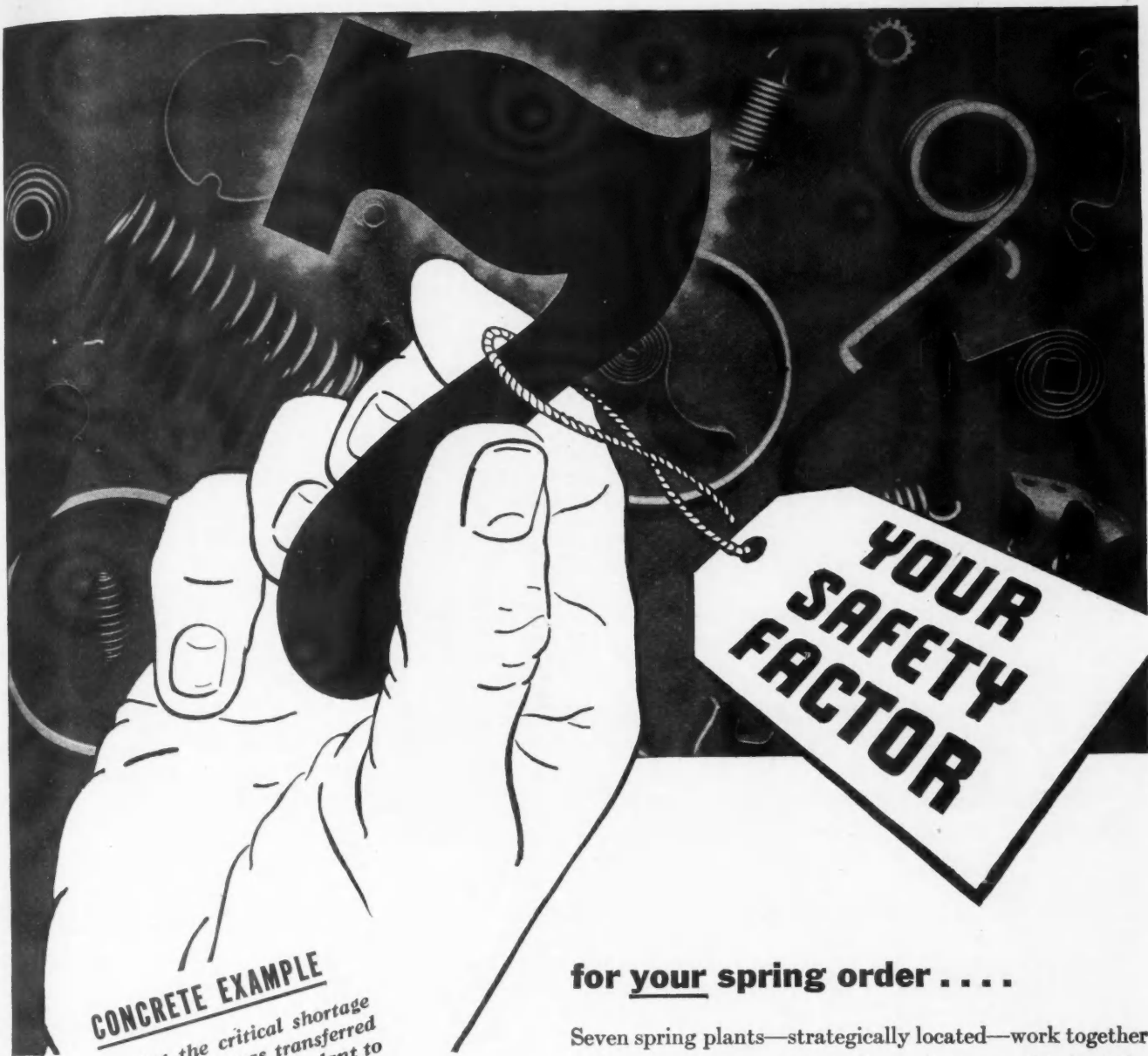
*Johnson* PRODUCTS INC.  
MUSKEGON, MICHIGAN

"Tappets Are Our Business"

**AUTOMOTIVE  
INDUSTRIES**

**Readers  
are always  
well  
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### CONCRETE EXAMPLE

During the critical shortage of gas, work was transferred from one Associated plant to another, thereby insuring delivery to customers.

### for your spring order . . . .

Seven spring plants—strategically located—work together to insure uninterrupted service to industry. Back of the plant you may do business with are other plants—equally qualified to assume production of your spring order—if needed. Enjoy this protection and service and select *your* spring source from the line-up below with confidence that your orders will have a safety factor of seven.

**SPRINGS ■ SMALL STAMPINGS ■ WIRE FORMS**

Original Divisions of the  
Associated Spring Corporation

**WALLACE  
BARNES  
COMPANY**  
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**RAYMOND  
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CORY,  
PENNSYLVANIA

**BARNES-  
GIBSON -  
RAYMOND**  
6400 MILLER AVE., DETROIT 11,  
and ANN ARBOR, MICH.

... AND DUNBAR BROTHERS COMPANY DIVISION, BRISTOL, CONN.  
OHIO DIVISION, 1712 EAST FIRST STREET, DAYTON, OHIO  
IN CANADA, THE WALLACE BARNES CO., LTD., HAMILTON, ONT.

## "The Outstanding Basic Improvement in FLEXIBLE SHAFT Machinery in 25 Years"

The NEW Strand Rotoflex 4-speed gear drive Flexible Shaft Machine (shown upper right) is another step forward in Strand quality precision tools for faster, easier, more economical production work. The Rotoflex 4-speed gear drive employs a patented, new type of quick change gear drive utilizing 4 positive speeds by a unique and easy method of instantly changing from one speed to another. Rotoflex machines are powered with totally enclosed ball-bearing motors having speeds from 850 to 9000 R.P.M., depending on motor.

Standard type Strand machines, (lower right) give portable rotary power at constant speeds with dependable results in all grinding, buffing, drilling, wire brushing and rotary filing operations. Hundreds of types and models from 1/8 to 3 H.P. available with suitable attachments for your specific requirements.

*Distributors in all principal cities*

*Ask for Bulletin No. 43 and Catalog No. 30*



### This Business of Making Holes

Probably the making of holes in one way or another accounts for more machining operations in the metal-working industries than any other type of stock removal. Mass production cannot be maintained unless fast, accurate equipment for the precision machining of holes is on the job constantly. That is why, since 1901, metal-working shops have been using MOLINE HOLE HOG cost-reducing equipment in production work.

For such operations as Boring, Milling, Straight-Line Drilling, Universal Adjustable Spindle Drilling, Honing, Tapping, Reaming and Counterboring, or for ANY special problem, a Moline "Hole Hog" can do it for you faster at less cost.



**MOLINE TOOL COMPANY**  
100 20th Street Moline, Illinois

## Latest Innovations at GMC Bus Plants

*(Continued from page 29)*

speed, it is possible to sweep a vertical section in the same manner as with an automatic spray gun.

In addition to the spray booths for prime and finish coats, this line has a cleaning and washing station at the start of the line; a multiple station wet sanding deck following the second prime coat; and a multiple station bank for masking the body in preparation for finish coats.

As mentioned earlier the entire line-up of coach painting equipment is interrelated with the cyclic movement of the conveyor. It was necessary to make careful study of the time required for the hand operations of cleaning, spraying, masking, etc., to establish the maximum time required for the performance of the longest operation. The dwell interval of the conveyor also had to be related to the drying time in the ovens. If it is assumed that the basic time interval is 40 minutes, the interlocked controls of the system are set to hold the conveyor stationary for that period. At the end of each cycle of 40 minutes certain events occur. For one thing at the warning signal operators must clear out of the coach and all spray booth canopies must be returned to the end station. At the same time the oven doors at the entrance and exit ends open automatically. When the control board shows that all of the essential functions have been cleared, the mechanism starts the conveyor in motion.

It is well at this point to mention that coach bodies are spaced on the conveyor on 16-ft centers to establish a standard spacing at all points. The conveyor moves just 16 ft at each cycle, advancing the line by one body at a time. And as mentioned before the drying ovens, being of three-compartment design, will hold a coach for an interval equal to three complete cycles, thus giving adequate time for drying.

In addition to the large coach painting installations in the two plants, GMC also has an extensive small parts painting unit in each plant. The one in the Greyhound plant is larger and handles mostly aluminum parts. This line starts with a self-contained Bonderizing unit and dry-off oven, then continues through the prime spray booth and oven, ending with a second prime coat which is air-dried. This equipment, also installed by Newcomb-Detroit, features the familiar water tube type spray booth with built-in provision for supplying filtered air, and its own exhaust system.



# Enduring Precision



This spindle bearing is standard equipment on large spindles designed by a world-famous builder of precision grinders. For extreme accuracy, for freedom from vibration, and for enduring precision, only sleeve bearings will do. Where other types of bearing retain their accuracy only for months, Bunting Spindle Bearings endure for years. Where other complex types require a surgical standard of cleanliness and a watchmaker's skill for replacement, the Bunting Sleeve Bearing requires only common-sense and the services of a good mechanic.

The secret of this performance and long life lies in the film type of lubrication. A properly designed and well lubricated sleeve bearing need not acknowledge any superior. No other bearing type possesses its simplicity, its ruggedness, its ability to deliver accurate work for many years. These attributes are possessed by the sleeve bearing.

Bunting engineers are at your service whether your problem is a precision grinder spindle, an aircraft engine, an automobile engine, or something of more or of less exacting requirements. Bunting engineers utilize their extensive experience with bearings of all types in their work of designing Bunting Cast Bronze Sleeve Bearings. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in Principal Cities.

# Bunting

BRONZE BEARINGS

PRECISION BRONZE BARS

BUSHINGS

## Clear the Road for Free Enterprise

(Continued from page 25)

the common man more than the rich or well-to-do. If his job or his earning power do not depend on an expanding economy, as they often do, those of his children most certainly will when job-hunting time comes.

The rich can at least feed, house and clothe themselves out of investment income, and do it without risk if they choose. For instance, a man with a \$100,000 salary now has to get a gross return of approximately

9.23 per cent on any additional taxable income from investments to equal the net yield of two per cent tax-exempt bonds. The incentive thus offered for risk-taking is inadequate. The same considerations and restraints operate on all tax-payers, in varying degree, from the upper-middle income to the higher brackets.

According to Treasury estimates, under present tax rates and assuming a national income of \$200 billion this

year, people with incomes of over \$25,000 a year will this year constitute only four-tenths of one per cent of all Federal income taxpayers, but will pay 26.4 per cent, or over \$5.6 billion, of total taxes. Yet they have only 8.1 per cent of total net income, before exemptions. In the past, this group was the largest source of the risk-capital flowing from individuals to feed an expanding economy.

With this source of equity capital partially dried up, industry must depend predominantly on its surplus profits or on borrowing to finance the expansion or modernization of productive facilities. The surplus profits—even with only some 40 per cent of earnings being paid in dividends during the past two years, against 75 per cent or so in many good prewar years—have not nearly met the needs. Hence, much undesirable debt has had to be incurred. Last year, corporate new capital financing in the security markets totaled \$4.7 billion, of which 74 per cent was debt.

Full employment today means something like 60 million persons gainfully occupied; but ten years from now the equivalent condition would mean 65-67 million, for there is a net increase of hundreds of thousands of persons of working age each year. To make jobs for them will take risk-investment by somebody. In 1941 the average capital investment per worker in manufacturing industries was \$6000, and ran up to \$26,090 in the chemical industry. It is much more at the present level of costs.

In the long run our people must sink or swim together. Every group is tied to another, and all to the whole. So are employment, national income, profits and investment. At bottom, this most effective of all systems is simple—as simple as opportunity to get ahead, to put by a surplus and with it build for the future.

We can go forward if the unnecessary roadblocks are removed. Or we can drift under the deadening hand of the State, which will promise stability but give us stagnation. The crying need is for a national leadership which believes 100 per cent in the private-enterprise system, and in putting the national interest above all else. This requires an informed and vocal public, intent on that end.

### An Important Announcement From The FORD MOTOR COMPANY

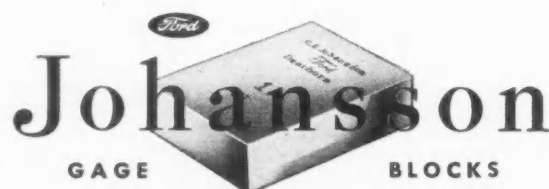
Since 1923, we have manufactured and distributed the world-famous Johansson Blocks.

We now have completed negotiations for the sale of the Johansson Gage Division of the Ford Motor Company to Brown & Sharpe Manufacturing Company of Providence, R. I. Before this transaction was completed, we gave very careful consideration to the problem of finding a company with the skill and experience that would assure continued production of Johansson Blocks to the Johansson standards of quality.

The Brown & Sharpe Manufacturing Company has 115 years of experience in the making of precision tools, and after careful study, we decided that this experience, coupled with their standing in American industry, made them the sound choice to take over the manufacture of these precision gages.

All patents, methods and machines required for making Johansson Blocks become the property of Brown & Sharpe. Machinery and special steel stocks are being moved to Providence.

Meantime we will continue to provide Johansson Blocks from available finished stock here at Ford until Brown & Sharpe are in operation and ready to supply them.



**FORD MOTOR COMPANY**

Readers of  
Automotive Industries  
are Always  
Well Informed

# New Toolroom Technique

**Grinding precision-spaced holes in hardened steel  
no longer rated time-eater as P&W Jig Grinder takes over**

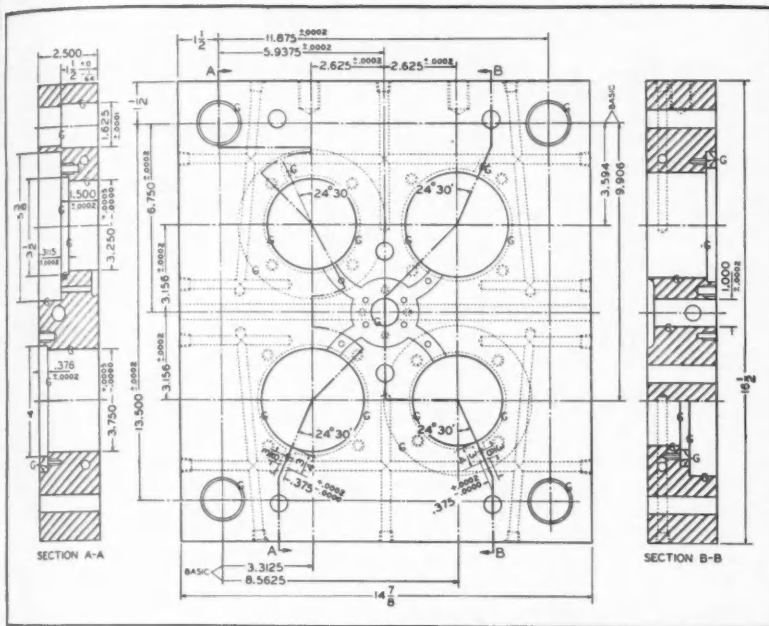
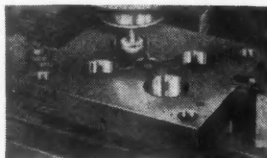


Diagram shows one-half of a hardened die casting adapter made for Veeder-Root, Inc., long famed for its precision die castings. Accurate grinding was essential because sixty different round dies must fit *interchangeably* and accurately into these holes.

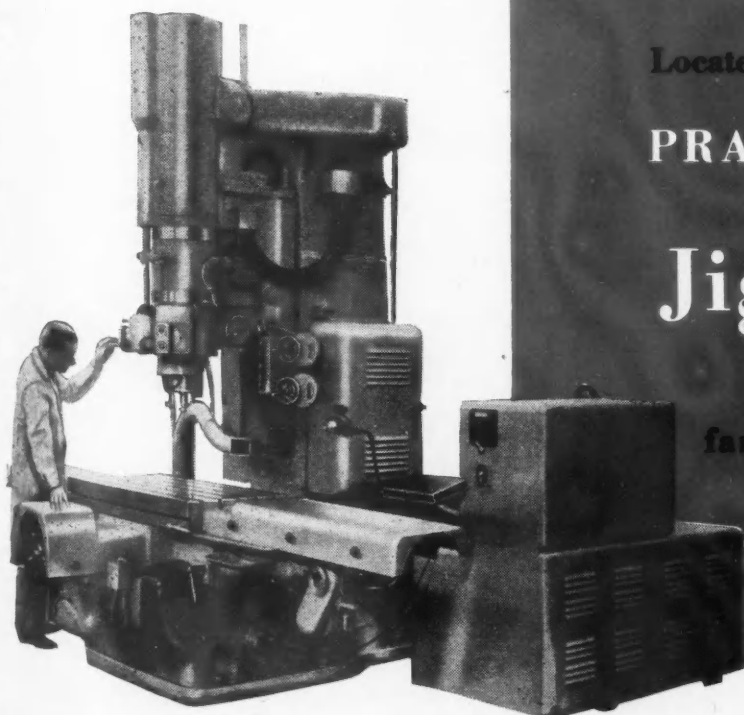


Examining this "blueprint," any tool engineer would ordinarily guess two or three weeks for grinding all the holes, shoulders, and key slots in this piece to the close tolerances demanded. Yet it took only fifty hours (including set-up time) to grind all those holes and slots, in steel hardened to 50 C Rockwell.

This record was set by P&W's new all-electric Jig Grinder. Companion to P&W's Jig Borer, this machine combines a powerful vertical grinding machine with the P&W Jig Borer's method of precision locating. The result is a new machine which locates, grinds, and checks its own work — to "tenth" precision — on hole spacing, diameter, and depth. And, with a rapid metal removal rate and a wide range of spindle speeds up to 54,000 R.P.M., the Jig Grinder opens the way to many jobs otherwise prohibitively expensive or impossible. It will pay any tool engineer to investigate.

For a complete, illustrated case history of this precision grinding job, write

**PRATT & WHITNEY**  
Division Niles-Bement-Pond Co.  
WEST HARTFORD 1, CONNECTICUT



Locates + Grinds + Checks

**PRATT & WHITNEY**

ALL-ELECTRIC

**Jig Grinder**

Companion to the  
famous P&W Jig Borer



"There is no better-paying investment  
than the right tools for the job"



## PUBLICATIONS

(Continued from page 56)

gineering specifications, etc. The "Kathanode" booklet, GB-574, illustrates and describes the Kathanode battery, gives engineering specifications, etc.

### L-8—Speed Control

The Pierce Governor Co., Inc.—Control, a new 8-page illustrated booklet features a technical discussion of governing to obtain the ultimate in engine efficiency and performance. Protection against over speed, constant speed regulation and miles per hour control for automotive installations are discussed.

### L-9—Boring and Facing Tools

Bokum Tool Co.—Several additions to its line of single point boring and facing tools are described and illustrated in a new catalog. Dimension and price tables are given for the three styles of tools.

### L-10—Spring Clutches

L.G.S. Spring Clutch Corp. (Div. Curtiss-Wright Corp.)—information is given in Bulletin 448, Clutch Engineering, on the selection and application of L.G.S. Spring Clutches.

Text includes a description of the various features, typical uses, etc. Illustrations include diagrammatic drawings and actual photographs of the different clutches.

### L-11—Hydraulic Grinders

Landis Tool Co.—Type CH Plain Hydraulic Grinding Machines are described and illustrated in a newly revised catalog featuring special sections on automatic visual sizing and grinding with the wheel base set at an angle. Pictures of the machines and line drawings, together with specifications are given.

### L-12—Carriers

Rolock, Incorporated — Custom-Built carriers for all types of heat treating, cleaning and processing are described and illustrated in a new catalog. Required data for ordering carriers is given.

### L-13—Cutting Tools

Reltool Corp.—The complete line of Reltool Metal Cutting Tools is presented in a new 72-page catalog. A detailed index makes it easy to locate items, classified as follows: End Mills, Special Small End Mills, End Mill Holders, Milling Cutters, Metal Slitting Saws, Special Saws, etc.

### L-14—Flexible Tubing

Titeflex, Inc.—Titeflex all-metal flexible tubing is illustrated and described in a 24-page catalog recently published. In addition to Titeflex brass tubing, the catalog describes the company's new bronze tubing for nominal steam pressure applications, monel and stainless steel tubing for higher temperatures and corrosion resistance, and inconel tubing for extremely high temperatures. Specifications are included for standard fittings and illustrations of typical assemblies. Bendable pipe, high frequency conductors and vibration eliminators are described.

### L-15—Fire Extinguishers

Ansul Chemical Co.—Charts showing the characteristics of approved hand fire extinguishers and the comparative effectiveness of approved extinguishers on flammable liquid fires are features of a new catalog made available by the company. In the 20-page booklet is illustrated and described the company's complete line of dry chemical fire extinguishers.

### L-16—Wrenches for Self-Locking Nuts

The Palnut Co.—Wrenches for the Assembly of Palnut Self-Locking Nuts is the title of a new bulletin covering wrenches especially designed to facilitate assembly of these Self-Locking Nuts.

# HANNIFIN

Hydraulic

a Plus Value



HONED True Bored

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### ASK FOR A COPY OF THIS BULLETIN!

- Everything you want in Hydraulic Cylinders! A big 52 page catalog listing standard Hannifin Cylinders, complete with specifications, dimensions, and engineering data. It's easy to get the cylinder that's specially designed for your job right out of Hannifin's standard line. Ask for Bulletin 110- W.

## HANNIFIN CORPORATION

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AIR CYLINDERS • HYDRAULIC CYLINDERS • HYDRAULIC PRESSES  
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Nationwide Sales and Service

*Last Summer's Heat*

# LAI D A HEAVY HAND on PRODUCTION

## THE LOW COST OF COOLING AND VENTILATING HOT SPOTS IN PLANT OR OFFICES WITH FRESH-AIR MAKERS WILL SURPRISE YOU

You can transform an entire department into a well ventilated good-place-to-work, boost morale and increase output with a few well placed Fresh-Air Maker fans, and they will pay off extra well where women are working.

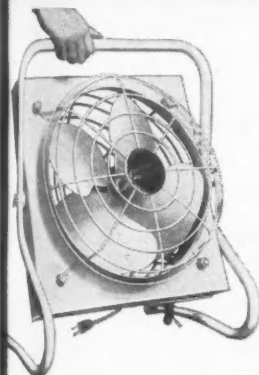
Fresh-Air Makers are a "natural" for foundries and to take the heat, smoke, fumes and general discomfort away from forging operations, heat treating, annealing, ovens, tanks, or any place where heat is used in processing.

And Fresh-Air Makers will pay big dividends in freshening up plant and administrative offices, canteens, first-aids, reception rooms, lockers, or those places stuck away off, behind or up on balconies and used for cribs, records, or stock, where no one can possibly do his best.

There are twelve sizes of Fresh-Air Makers to handle any job, large or small, up to 20,500 cfm for a single fan, all unusually adaptable to installation conditions. Use them on the floor or at the ceiling, as exhausters in the wall, in lofts, on the roof in monitors or penthouses, or in the ceiling for all Fresh-Air Makers are equipped with fine ball bearings to permit horizontal installation if desired.

**AIR HANDLING  
AT ITS  
QUIETEST  
BEST!**

Characteristic Industrial Fresh-Air Maker—a powerful, belt driven fan, all welded construction, with four deep pitched wide blades, accurately balanced, quiet and of exceedingly low power consumption—steel parts all heavy gauge and fan carried on two fine, prelubricated ball bearings.



portable models adjustable for any angle—12"—16"—20"—exhaust or adjustable blow models also.



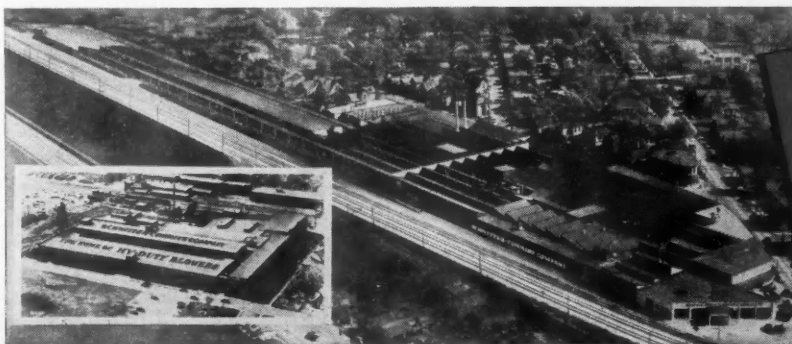
Non-ferrous Foundry—3-48" Fresh-Air Makers (61500 cfm) in roof.



Comfort by portable Fresh-Air Makers in a machine shop office.



For main entrance, ventilating reception room.



**OUR OWN PLANTS COOLED  
AND VENTILATED WITH  
FRESH-AIR MAKERS—A  
WONDERFUL ADDITION TO  
GOOD WORKING CONDITIONS**

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*Builders of Fine Fans for 30 Years*



## In the Field of Irrigation

It is in the field of Irrigation that Layne Well Water Systems and Layne Vertical Turbine Pumps are most appreciated for their outstanding superiority of design, construction and quality. Of all places, the Irrigation field must have the utmost in dependability for long periods of continuous pumping. It is in this field that Layne water producing equipment is easily a 10 to 1 favorite in every case where ground water is used. Such leadership is highly complimentary to excellence of performance.

Basically, Layne Well Water Systems are extremely practical in design, and this design is noted for high efficiency. And supporting practical design and high efficiency, there is that well known Layne quality that assures longer life and practically no upkeep expense.

Layne Well Water Systems are designed for use in all situations where huge quantities of water must be produced at the lowest possible cost; packing houses, municipalities, factories, chemical processing plants, milk plants, petroleum refineries, railroads, etc.

For further interesting facts, literature, bulletins, etc., address

**LAYNE & BOWLER, INC.**  
General Offices  
MEMPHIS 8, TENN.



**AFFILIATED COMPANIES:** Layne-Arkansas Co., Stuttgart, Ark. \* Layne-Atlantic Co., Norfolk, Va. \* Layne-Central Co., Memphis, Tenn. \* Layne-Northern Co., Mishawaka, Ind. \* Layne-Louisiana Co., Lake Charles, La. \* Louisiana Well Co., Monroe, La. \* Layne-New York Co., New York City \* Layne-Northwest Co., Milwaukee, Wis. \* Layne-Ohio Co., Columbus, Ohio \* Layne-Pacific, Inc., Seattle, Wash. \* Layne-Texas Co., Houston, Texas \* Layne-Western Co., Kansas City, Mo. \* Layne-Western Co. of Minn., Minneapolis, Minn. \* International Water Supply Ltd., London, Ont., Can. \* Layne-Hispano Americana, S. A., Mexico, D. F.

## General News

(Continued from page 23)

### GM Australian Car to Be 18-hp Model

The new light car under development by General Motors Holdens Co., GM subsidiary in Australia, is reported to be an 18-hp model to be sold at between \$1800 and \$2000. Production is expected to begin in mid-1949 and to total about 20,000 a year at plants located in Victoria and South Australia.

### Vance Succeeds Hoffman as Official of AMA

Directors of AMA have elected Harold S. Vance, president and chairman of the board of Studebaker Corp., vice president and director. He succeeds Paul G. Hoffman, former Studebaker president, who recently resigned to become administrator of ECA. The board also elected E. J. Bush, president of Diamond T Motor Co., a vice president and director. He replaces Robert F. Black, president of White Motor Co. as vice president. Mr. Black will continue as an AMA director. All other officers of the association were re-elected.

### Ford to Sell Cars Through Japanese Dealers

The Ford Motor Co. has been granted permission to sell automobiles through accredited Japanese agencies to non-occupational personnel in Japan according to a report from Allied Headquarters in Tokyo. Ford is understood to be the only American automobile company to ask for permission to sell through Japanese channels, but it is believed other manufacturers will soon apply for similar arrangements.

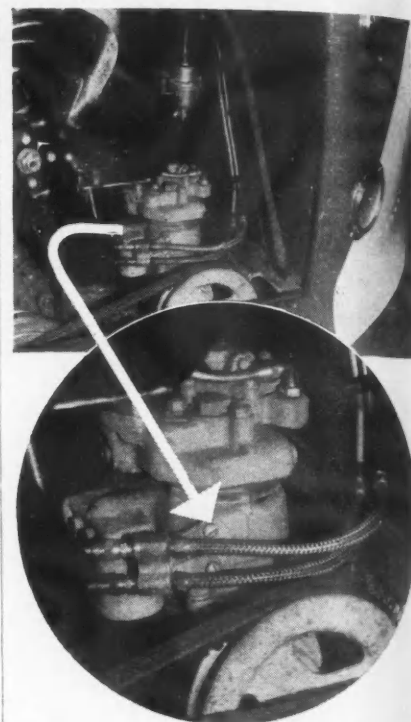
### Name Johnson Head of Sealed Power

Paul C. Johnson has been appointed executive vice president of Sealed Power Corp. Mr. Johnson, who had been vice president in charge of sales, succeeds Neil A. Moore who resigned as vice president and general manager after more than 20 years service.

### New Ford's Lower Weight Aids Fuel Economy

Much of the improved fuel economy of the 1949 Ford is undoubtedly due to the greater horsepower-to-weight ratio. The car is more than 200 lb lighter than its predecessor model despite the fact that its inside dimensions are much greater. Harold Youngren, Ford engineering chief, said recently that the car is lighter because of more efficient design. He said the tread was narrowed to a uniform 56 in. to fit in with the advanced styling and to provide better tracking.

(Turn to page 84, please)



## the FLXIBLE COMPANY of Loudonville, Ohio

one of the many prominent vehicle manufacturers who use—

### Titeflex Automotive Lines

The two TITEFLEX lines illustrated are air lines used to operate the "shutterstat" on a Flexible coach. In addition to being air tight, these lines must be capable of withstanding both heat and cold. The all-metal construction of the TITEFLEX lines satisfies these conditions on every count.

We would like to tell you more about TITEFLEX oil, gas, hydraulic, and air lines—the lines that are specified by so many leading bus and truck manufacturers because they are made to stand up under the most severe service conditions. TITEFLEX lines seldom, if ever, need to be replaced. Write for literature, or, if you prefer, we will have our representative call.

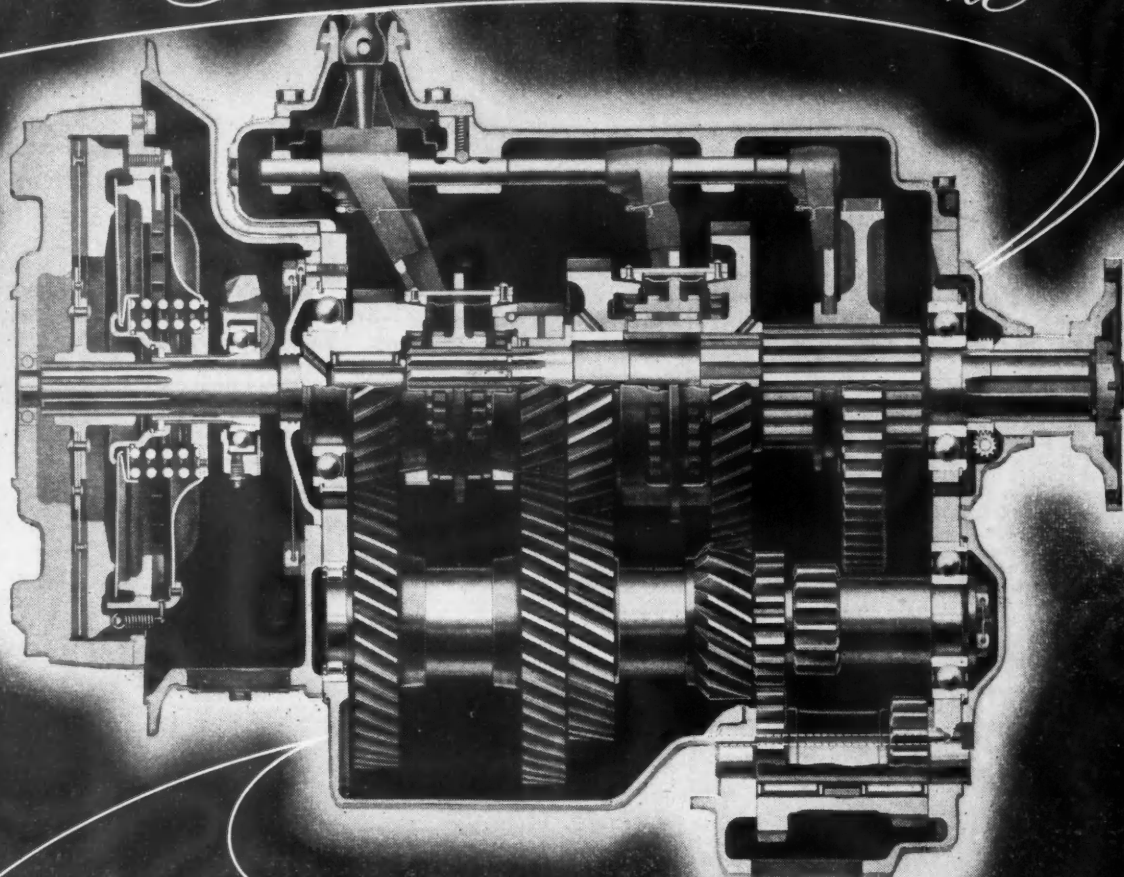
Titeflex, Inc., 507 Frelinghuysen Ave., Newark 5, N.J.

**Titeflex**

All-Metal Flexible Tubing



*Let's look inside a*



# Spicer *Synchronized Transmission*

## AND SEE WHY IT'S BETTER

These are *construction* features of the Spicer Brown-Lipe Synchronized Transmission, that are built in at the world's most modern and efficient transmission plant:

1. Brown-Lipe Quality Gears Assure Longer Life.
2. Larger Center Distance — Larger Gears — Reduced Tooth Loads and Bearing Loads.
3. Bearings of Large Size and Finest Quality.
4. Synchronized Shifts Stop Clash and Crash Damage — No Chips in Oil.
5. Provision Made for Application of Standard S. A. E. Power Take-Off on Either Side of Transmission.
6. Tower Control (illustrated above) or Interchangeable Remote Control Available.

These are *performance* features of the Spicer Brown-Lipe Synchronized Transmission, that assure you fast vehicle operation and low maintenance costs:


1. Faster Shifts.
2. No Missed Shifts.
3. Fast Getaway.
4. Less Vehicle Slowdown When Shifting.
5. Down Shifts Made Without Slow-Down for Double Clutching.
6. No Lugging of Engine.
7. Shifting Lever Travels Same Distance Every Shift.

Spicer engineers have the know-how...the Spicer plant has the equipment...to meet your individual requirements in automotive power transmission equipment.



**SPICER MANUFACTURING** • Division of Dana Corporation  
TOLEDO 1, OHIO

PASSENGER CAR AXLES • CLUTCHES • PARISH FRAMES • STAMPINGS • UNIVERSAL JOINTS  
SPICER "BROWN-LIPE" GEAR BOXES • RAILWAY GENERATOR DRIVES



**DOES CUT  
PRODUCTION COSTS**

**ELECTRICAL MFR.  
WRITES . . . . .**  
(Name on File)

"The savings effected in this one job alone are outstanding. Roto-Finish has enabled us to increase the production of one assembled unit from 94 units per day to 300 per day by releasing five regular operators who ordinarily would be assembling the units from a tedious filing job."



Unretouched illustration shows copper segment at top before Roto-Finish deburring and finishing; below after Roto-Finishing.

Roto-Finish is a mechanical deburring and finishing process—producing staggering savings in labor costs over manual operations. One operator can finish quantities of parts uniformly and accurately in a fraction of the time required by hand. Roto-Finish likewise removes a job that is tedious, time consuming and distasteful to employees. It eliminates need of elaborate, costly dust control systems. Send samples of die castings, sand castings, stampings, machined parts, forgings for processing. (Include finished part for guide.) No obligation!

**THE STURGIS PRODUCTS CO.**  
869 JACOB ST., STURGIS, MICHIGAN

**ROTO-FINISH**  
THE ENGINEERED  
MECHANICAL FINISHING PROCESS

## General News

(Continued from page 82)

### Walworth Made Head of Reo Engineering

William M. Walworth has been appointed chief engineer of Reo Motors, Inc. He succeeds Karl K. Probst, who is resigning to reenter the consulting and development field. Mr. Walworth was formerly vice president and chief engineer of Mack Trucks, Inc.

### Federal Reserve Board Finds Car Prospects Bright

The third annual survey of consumer finances conducted by the Federal Reserve Board confirms all optimistic reports about the automobile industry. It shows that about seven million buyers purchased new or used automobiles in the United States last year, and that demand shows no sign of diminishing.

### Automotive Industry Largest User of Steel Products

The American Iron & Steel Institute reports that the automotive industry in 1947 was the largest single user of steel and took the largest tonnage in its history. Shipments to the industry totaled 9,273,000 net tons, or about 14.7 per cent of total shipments of finished steel.

### Fisher to Close Plant at Ionia, Mich.

GM's Fisher Body Div. has announced that it will permanently close its plant in Ionia, Mich., which has been in operation since 1937. The factory, which produces upholstery trim, is in rented quarters. A Fisher spokesman said that the company has surplus plants of its own elsewhere to which the Ionia operations could be transferred at a rental saving.

### Tractor Buyers Market About 12 to 14 Months Away

Apparently the return of the buyer's market in farm tractors is still many months away. Frank R. Pierce, president of Dearborn Motors Corp., distributor of Ford tractors, said recently that the company's dealers have on hand enough bona fide orders to take all tractor production for the next 13 or 14 months. At a demonstration showing 45 new farm implements which were added to the Dearborn line during the last year, he said that Dearborn Motors is now putting 9000 tractors and 40,000 implements into farmers' hands each month. Sales this year, he said, would exceed 100,000 tractors and 500,000 Dearborn implements. This month the company will reach the 100,000 mark in tractor sales just one year from the time it took over the marketing activities from Harry Ferguson, Inc.

### New Synthetic Fuel Plant to be Built in Kansas

The oil industry is serious about announced plans to build synthetic fuel plants. Stanolind Oil & Gas Co. will start construction about July 1 of a hydrocarbon synthesis plant at Garden City, Kans. Three major units will be built, including an oxygen plant, synthesis unit, and a chemical refining plant.

### Station Wagon Popularity Continues Steadily

Figures compiled by the AMA indicate the great popularity growth of the station wagon since 1936. In that year production totaled 6347 units, or .17 per cent of total passenger car output. Since 1939 percentage of station wagons to total car production has increased steadily, going from .59 per cent in 1939 to .69 per cent in 1940; .85 per cent in 1941; 1.38 per cent in 1946; and to 2.23 per cent last year. Figures for the first quarter of 1948 indicate that the trend is continuing upward with production of 27,428 station wagons representing 2.95 per cent of passenger car production. More station wagons were built in the first quarter of this year than in any other full year, except 1941 when 32,216 were built.

### Tucker Abandons Disk Brake and Direct Torque Drive

Apparently The Tucker Corp. has modified some of the original features of its new automobile. It is reported that the airplane type disk brake has been abandoned in favor of conventional automotive brakes and that the direct coupled torque converter is to be replaced by a conventional four-speed transmission. Also, Preston Tucker, company president, said recently that he hopes to sell the car for about \$2500, which is considerably higher than the \$1800-\$2000 price range he predicted a year ago.

### British Machine Tool Co. Building New Car

The Murad Machine Tool Co., Ltd., Stocklake, Aylesbury, Bucks, England is now tooling up for a new car, the Murad, which is reported to have several unusual features. Powered by a four cyl engine, developing 51 hp at 4600 rpm, the car has a wheelbase of nine ft, four in., and a tread of four ft, seven in. It is expected that the car will be in production at the end of this year, with deliveries scheduled to start early in 1949.

### Frank M. Hardiman

Frank M. Hardiman, 58, general manager of GM's Harrison Radiator Div., died June 11 in Buffalo, New York.